APPLICATIONS LIBRARY PROGRAMS

Accounting, Economics, Finance, Invent
ecurity/Investments, Analysis, Payroll, C
ivil Engineering, Electrical Engineering,
Mechanical Engineering, Aerospace, Me
hemistry, Geology, Physics, Electrical E
tatistics, Geography, Accounting, Econo
Finance, Inventory, Analysis, Payroll, Aer
ivil Engineering, Mechanical Engineering
edical, Chemistry, Geology, Physics, Pa
Aerospace, Security/Investments, Analys
ayroll, Mathematics, Medical, Inventory, C
nalysis, Mechanical Engineering, Chemis

Tektronix®
COMMITTED TO EXCELLENCE

APPLICATIONS LIBRARY PROGRAMS
SEPTEMBER 1981

Title	Package #	Manual Only #
BUSINESS AIDS T1	062-5987-01	062-5987-00
BUSINESS AIDS T2	062-5988-01	062-5988-00
CAD T1	062-5976-01	062-5976-00
CAD D1	062-5977-01	062-5977-00
CHARACTER GENERATOR T1	062-5951-01	062-5951-00
EDUCATION/RESEARCH T1	062-5982-01	062-5982-00
EDUCATION/RESEARCH T2	062-5983-01	062-5983-00
ELECTRICAL ENGINEERING T1	062-5978-01	062-5978-00
GRAPHING T1	062-5964-01	062-5964-00
GRAPHING T2	062-5965-01	062-5965-00
GRAPHING T3	062-5966-01	062-5966-00
GRAPHING D1	062-5967-01	062-5967-00
GRAPHING D2	062-5968-01	062-5968-00
INTERFACING T1	062-5984-01	062-5984-00
MAPPING T1	062-5980-01	062-5980-00
MECHANICAL ENGINEERING T1	062-5979-01	062-5979-00
PROGRAMMING AIDS T1	062-5971-01	062-5971-00
PROGRAMMING AIDS T2	062-5972-01	062-5972-00
PROJECT AIDS T1	062-5985-01	062-5985-00
PROJECT AIDS D1	062-5986-01	062-5986-00
RECREATIONAL PLOTS T1	062-5989-01	062-5989-00
SLIDEMAKER T1	062-5962-01	062-5962-00
SLIDEMAKER D1	062-5963-01	062-5963-00
TEXT PROCESSING T1	062-5969-01	062-5969-00
TEXT PROCESSING D1	062-5970-01	062-5970-00
UTILITIES T1	062-5974-01	062-5974-00
UTILITIES D1	062-5975-01	062-5975-00

The 4050 Series Applications Library is maintained as a service for our customers by the Information Display Division of Tektronix, Inc., Group 451, P.O. Box 500, Beaverton, Oregon 97077.

The program material contained herein is supplied without warranty or representation of any kind. Tektronix, Inc., assumes no responsibility and shall have no liability, consequential or otherwise, of any kind arising from the use of this program material or any part thereof.

The 4050 Series Applications Library Program Catalog is published by the Information Display Division of Tektronix, Inc., Group 451, P.O. Box 500, Beaverton, Oregon 97077. It is distributed to TEKTRONIX 4050 Series Users and members of the 4050 Series Applications Library.

Publishing Manager	Ken Cramer
Managing Editor	Rory Gugliotta
Editor	Patricia Kelley
Graphic Design	John Ellis

Catalog Number 062-6343-00

Program Exchange

All members* of the 4050 Series Applications Library are eligible to participate in the program exchange.

Send the completed documentation and submittal forms and your program on tape or disk to the Applications Library serving your area. Upon acceptance, one Application Library Package of your choice from the Applications Library will be returned to you.

If you need additional documentation/submittal forms, please contact your local Tektronix Sales Engineer or write to the Applications Library serving your area.

*Membership in the Library is free. Just complete and mail in the 4050 Series Applications Library card in the front of your 4050 Series Reference Manual.

Desktop Computer Applications Library Program Exchange Forms

Documentation Instructions (order by title)

Documentation—Page 1 .... 000-6405-00 7/80

Documentation—User-Definable Key Overlay Page 000-6405-01 7/80

Documentation—Succeeding Pages 000-6405-02 7/80

Submittal Form 000-6395-00 7/80

Package Information

Most of the abstract information is self-explanatory. However, clarification of two segments may be necessary.

Peripherals— Each abstract notes required or optional peripherals with the exception of the 4631 Hard Copy Unit. Since it can always be used to copy the screen, it can always be an optional peripheral and thus is not specifically noted.

Files— Many of the programs maintain their own storage files; consequently, each of those programs must be transferred to its own tape or disk. The abstract will indicate if this is necessary and the documentation will detail the steps necessary to accomplish the transfer.

New Packages

New packages will be announced via **TEKniques** and supporting catalog pages will be distributed to all Library members.

Ordering—General Information

Contact your local Tektronix field office to place your order.

Applications Library Packages include the media ("T" = Tape, "D" = Disk) and documentation (without listings). Documentation is available separately.

Current prices are available from your local Tektronix field office.

4050 SERIES GRAPHIC SYSTEMS
ORDERING - ADDRESSES

Tektronix, Inc.
Information Display Division
Post Office Box 4828
Portland, Oregon 97208
Telephone: (503) 682-3411
(800) 547-1512
TWX: 910-467-8708
Cable: TEKTRONIX

ALABAMA
Huntsville 35801
Suite 203
3322 South Memorial Parkway
Phone (205) 881-2912

ARIZONA
Phoenix 85040
Suite 100
4130 East Wood Street
Post Office Box 29540
Phone (602) 268-8861
Tucson area: ENterprise 383

CALIFORNIA
(Concord)
3451 Vincent Road
Pleasant Hill 94523
Phone (415) 932-4949
(415) 932-4722
From Oakland: (415) 254-5353

Irvine 92714
17052 Jamboree Boulevard
Post Office Box 19523
Phone (714) 556-8080
(213) 778-5225

(Los Angeles)
21300 Erwin Street
Post Office Box 8500
Woodland Hills 91367
Phone (213) 999-1711

San Diego 92111
Suite 401
7827 Convoy Court
Phone (714) 292-7330

Santa Clara 95050
3003 Bunker Hill Lane
Phone (408) 496-0800

COLORADO
(Denver)
Suite 4A
14 Inverness Drive East
Englewood 80112
Phone (303) 773-1011
Telex: (Infocom) 45-4455

Copyright ©1981, Tektronix, Inc.
All rights reserved. Printed in
U.S.A. Tektronix products are
covered by U.S. and foreign pat-
ents, issued and pending. Speci-
fication and price change privi-
leges reserved.

CONNECTICUT
Milford 06460
40 Commerce Park Road
Phone (203) 877-1494

FLORIDA
Fort Lauderdale 33309
Suite B
2745 Northwest 62nd Street
Phone (305) 973-9300
Also serves Puerto Rico and
U.S. Virgin Islands
From Miami: 947-6053

Orlando 32803
Suite 100
3657 Maguire Boulevard
Phone (305) 894-3911
From the Cape Kennedy area:
636-0343

Pensacola 32505
6425 North Pensacola Boulevard
Phone (904) 476-1897

GEORGIA
(Atlanta)
3320 Holcomb Bridge Road
at Peachtree Industrial Boulevard
Post Office Box 1246
Norcross 30091
Phone (404) 449-4770

HAWAII
Honolulu Service Center
EMC Corporation
2979 Ualena Street
Phone (808) 836-1138

ILLINOIS
(Chicago)
5350 Keystone Court
Rolling Meadows 60008
Phone (312) 259-7580

INDIANA
Indianapolis 46219
6121 East 30th Street
Phone (317) 545-2351

KANSAS
(Kansas City)
Suite 62
10580 Barkley
Overland Park 66212
Phone (913) 341-3344

LOUISIANA
(New Orleans)
1940 I-10 Service Road
Concourse Place
Kenner 70062
Phone (504) 466-4445

MARYLAND
(Baltimore)
1526 York Road
Lutherville 21093
Phone (301) 321-7000

Rockville 20850
2 Research Court
Phone (301) 948-7151
(Rockville Annex)
19 Firstfield Road
Gaithersburg 20760
Phone (301) 948-7151

MASSACHUSETTS
(Boston)
482 Bedford Street
Lexington 02173
Phone (617) 861-6800

MICHIGAN
(Detroit)
24155 Drake Road
Farmington 48024
Phone (313) 478-5200

MINNESOTA
St. Paul 55112
4660 Churchill Road
Phone (612) 484-8571

MISSOURI
(St. Louis)
422 Anglum Road
Hazelwood 63042
Phone (314) 731-4696

NEW MEXICO
Albuquerque 87108
1258 Ortiz Drive SE
Phone (505) 265-5541
Southern New Mexico and
Southern Nevada areas:
ENterprise 678

NEW JERSEY
Woodbridge 07095
40 Gill Lane
Phone (201) 636-8616

NEW YORK
Albany 12205
16 Computer Drive West
Phone (518) 458-7291

(Long Island)
100 Crossways Park West
Woodbury, LI 11797
Phone (516) 364-9060
(212) 895-9215

Poughkeepsie 12603
38 Haight Avenue
Phone (914) 454-7540

Rochester 14623
1210 Jefferson Road
Phone (716) 424-5800

(Syracuse)
1 Northern Concourse
North Syracuse 13212
Phone (315) 455-6661
From New York: (800) 962-1095

NORTH CAROLINA
Raleigh 27612
Suite 104
3725 National Drive
Phone (919) 782-5624

OHIO
Middleburg Heights 44130
7830 Freeway Circle
Phone (216) 243-8500

Dayton 45449
501 Progress Road
Phone (513) 859-3681

OKLAHOMA
Oklahoma City 73105
Suite 201
800 Northeast 63rd
Phone (405) 848-3361

OREGON
(Portland)
Suite K-4
10220 Southwest Nimbus Drive
Tigard 97223
Phone (503) 620-9100

Factory Service Center
Tektronix Industrial Park
Beaverton 97077
Phone (503) 644-0161
Telex: 910-467-8708

PENNSYLVANIA
(Philadelphia)
1720 Walton Road
Blue Bell 19422
Phone (215) 825-6400
From Harrisburg, Lancaster, and
York areas: ENterprise 1-0631

Pittsburgh 15221
Suite 300
1051 Brinton Road
Phone (412) 244-9800

TENNESSEE
Knoxville 37923
Suite 616
9041 Executive Park Drive
Phone (615) 690-6422

TEXAS
Irving 75062
1551 Corporate Drive
Post Office Box 5027
Phone: (214) 258-0525

Houston 77099
10887 South Wilcrest Drive
Phone (713) 933-3000

San Antonio 78226
3311 Roselawn
Phone (512) 434-4334

UTAH
Salt Lake City 84115
Timesquare Park 300 Mercer Way
Phone (801) 486-1091

VIRGINIA
Newport News 23602
Suite 703
606 Denbigh Boulevard
Phone (804) 874-0099

WASHINGTON
(Seattle)
19026 72nd Avenue South
Kent 98031
Phone (206) 575-0180

AFRICA, EUROPE,
MIDDLE EAST

ALGERIA
Measurelec
Algiers
Phone: 61.50.99 and 61.50.24
(Algiers)

AUSTRIA
Rohde & Schwarz-Tektronix
Ges.m.b.H.
Vienna
Phone: Vienna 62 61 41

BELGIUM
TEKTRONIX vn/sa
Bruxelles
Phone: 02/720.80.20

BULGARIA
Rohde & Schwarz-Tektronix
Ges.m.b.H.
Vienna, Austria
Phone: Vienna 62 61 41

CZECHOSLOVAKIA
Rohde & Schwarz-Tektronix
Ges.m.b.H.
Vienna, Austria
Phone: Vienna 62 61 41

DENMARK
Tektronix A/S
Herlev
Phone: (02) 84 56 22

**EAST AFRICA (Kenya, Tanzania
and Uganda)**
Engineering & Sales Co., Ltd.
Nairobi, Kenya
Phone: 26815

EGYPT
Giza Systems Engineering
Company
Cairo
Phone: 98 7114, 98 7276

**FEDERAL REPUBLIC
OF GERMANY**
Rohde & Schwarz
Vertriebs Ges.m.b.H.
Köln
Phone: (0221) 77 22-1

FINLAND
Tektronix O/Y
Helsinki
Phone: 90-722 400

FRANCE
TEKTRONIX
Orsay
Phone: 907 94 00
Lyon
Phone: (78) 76.40.03
Aix-en-Provence
Phone: (42) 59 24 66
Rennes
Phone: (99) 51 21 16
Strasbourg
Phone: (88) 39 49 35
Toulouse
Phone: (61) 40 24 50

GREECE
Marios Dalleggio
Representations
Athens
Phone: 710.669

HUNGARY
Rohde & Schwarz-Tektronix
Ges.m.b.H.
Vienna, Austria
Phone: Vienna 62 61 41

ICELAND
Kristjan O. Skagfjord Ltd.
Reykjavik
Phone: 24120

IRAN
Irantronics Company Ltd.
Tehran
Phone: 828294, 831564, 836466,
834459

IRAQ
Al Manar Engineering WLL
Baghdad
Phone: 60992 or 8880333

ISRAEL
Eastronics Ltd.
Tel Aviv
Phone: 475151

ITALY
Tektronix Italia,
Milano via Lampedusa 13
Phone: 20100

IVORY COAST
SITEL
Abidjan (cote d'Ivoire)
Phone: 32.18.52 & 32.14.75

JORDAN
TAREQ Scientific Bureau
Amman
Phone: 36855 & 22855

KUWAIT
TAREQ Company
Phone: 436100 & 436045

LEBANON
Projects S.A.L.
Beirut
Phone: 251680

MOROCCO
SCRM
Casablanca
Phone: 27 69 11

THE NETHERLANDS
Tektronix Holland N.V.
Badhoevedorp
Phone: 02968-1456

NIGERIA
Mofat Engineering Co. Ltd.
Lagos
Phone: 935744
Ibadan
Phone: 22824

NORWAY
Tektronix Norge A/S
Oslo
Phone: 02-212855

POLAND
Rohde & Schwarz-Tektronix
Ges.m.b.H.
Vienna, Austria
Phone: Vienna 62 61 41

PORTUGAL
Equipamentos de
Laboratorio Lda.
Lisbon
Phone: 97 65 51

ROMANIA
Rohde & Schwarz-Tektronix
Ges.m.b.H.
Vienna, Austria
Phone: Vienna 62 61 41

REPUBLIC OF SOUTH AFRICA
Protea Physical & Nuclear
Instrumentation (Pty.) Ltd.
Transvaal
Phone: (27 11) 786-3647
Paardeneiland (Cape Town Branch)
Phone: 51-3247
Durban
Phone: 39-1100

SAUDI ARABIA
Electronic Equipment Marketing
Co. Ltd.
Riyadh
Phone: 32700, 37023

SPAIN
Tektronix Espanola S.A.
Barcelona
Phone: 257.62.00
Madrid
Phone: 734-83-16

SUDAN
Cine & Photo Supply
Company (CPSC)
Khartoum
Phone: 75162, 76943 and 42478

SWEDEN
Tektronix AB
Solna
Phone: 08/83 00 80

SWITZERLAND
Tektronix International A.G.
Zug
Phone: 042 21 91.92

SYRIA
General Trading Company
Damascus
Phone: 114807, 224170, 559108

TURKEY
Erkman Elektronik Aletler
Istanbul
Phone: 44 15 46/44 76 51

TUNISIA
EL ESLEK
Tunis
Phone: 244372

UNITED KINGDOM
Tektronix U.K. Limited
Harpenden
Phone: Harpenden 63141, 61251

USSR
Rohde & Schwarz-Tektronix
Ges.m.b.H.
Vienna, Austria
Phone: Vienna 62 61 41

YUGOSLAVIA
Rohde & Schwarz-Tektronix
Ges.m.b.H.
Vienna, Austria
Phone: Vienna 62 61 41

ZAMBIA
Baird and Tatlock (Zambia) Ltd.
Lusaka
Phone: 75315/6
Ndola
Phone: 3522 & 2253/4/6

**Eastern European Countries
Not Listed, Contact:**
Rohde & Schwarz-Tektronix
Ges.m.b.H.
Vienna, Austria
Phone: Vienna 62 61 41

**Other Area Not Listed,
Contact:**
Tektronix Limited
Guernsey, Channel Islands
Phone: Guernsey 35781

TEKTRONIX
WORLDWIDE
MARKETING CENTERS

U.S.A.
Tektronix, Inc.
U.S. Marketing
Beaverton, Oregon
Phone: (503) 644-0161

AFRICA, EUROPE, MIDDLE EAST
Tektronix International Inc.
European Marketing Centre
Post box 827
Amstelveen, The Netherlands

**AMERICAS/PACIFIC
(Asia, Australia, Central &
South America, Japan)**
Tektronix, Inc.
Export Marketing
Beaverton, Oregon
Phone: (503) 644-0161

BUSINESS AIDS T1
062-5987-01

From helping you balance your check-book to analyzing gas/oil wells, you'll find a variety of business analysis routines contained in the 18 programs on this tape. The individual abstracts describe each program.

Title/
Previous Abstract #

Measures of Central Tendency
51/00-0715/0

Check Book Balancing
51/00-0601/0

Required Bank Reserve
51/00-0602/0

Arbitrage
51/00-0401/0

Moving Average
51/00-0701/0

Single Moving Averages With Graphics
51/00-0702/0

Double Moving Averages With Graphics
51/00-0703/0

Single Exponential Smoothing With Graphics
51/00-0704/0

Double Exponential Smoothing With Graphics
51/00-0705/0

Triple Exponential Smoothing With Graphics
51/00-0706/0

Single Weighted Averages With Graphics
51/00-0707/0

Double Weighted Averages With Graphics
51/00-0708/0

Petroleum Risk Analysis I
51/00-0709/0

Petroleum Economic Analysis I
51/00-0710/0

Petroleum Water Influx I
51/00-0711/0

Oil Reserves
51/00-0712/0

Gas Reserves
51/00-0713/0

Minimum Operating Cost for Two Aircraft
51/00-3101/0

Program 1

Title: **Measures of Central Tendency**
Author: Dennis Heckman
Tektronix, Inc.
Wilsonville, OR
Memory Requirement: 16K
Peripherals: Optional-4641 Printer
4662 Plotter
Statements: 290
Files: 1 ASCII Program

The program computes five measures of central tendency from weighted or unweighted data. Measures of central tendency include the Median, Harmonic Mean, Geometric Mean, Mean, and Root Mean Square.

Data is entered from the keyboard, the number of points limited only by memory. You may change the raw data, and the value of a specified weight. Y-axis scale is manual or automatic.

A histogram of the computational data is also prepared as are tables of deciles and quartiles for the data.
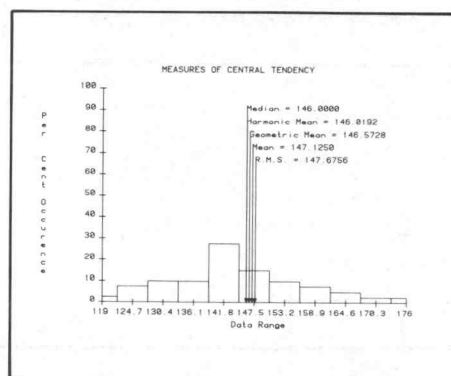
Program 2

Title: **Check Book Balancing**
Author: Kathy Thurman
Tektronix, Inc.
Wilsonville, OR
Memory Requirement: 8K
Statements: 125
Files: 1 ASCII Program

This routine helps the user balance his personal checkbook.

The user is prompted for:

1. Ending statement balance

2. Ending checkbook balance

3. All outstanding checks

4. All outstanding deposits

5. Check charges or handling costs

The output is the adjusted checkbook balance. If this does not agree with the statement balance after adjustments, the difference is printed out and the user is guided to check the entries he has made regarding his statement and check register. The user may enter any corrections or additions to the entries he has made. If these are all correct he may then check the register from where the last statement was balanced, checking all addition and subtraction to determine if his check register balance is correct.

Program 3

Title: **Required Bank Reserve**
Author: Kathy Thurman
    Tektronix, Inc.
    Wilsonville, OR
Memory Requirement: 8K
Statements: 131
Files: 1 ASCII Program

This program calculates the required bank reserve and prints a Statement of Reserve Position as of the close of any given business day. In addition it will print a table showing levels of demand deposits to ‡1% of the actual demand deposits, the required reserve for each level, excess or deficiency of reserve, cumulative position and Federal funds value.

The user inputs:

1. Demand deposits of banks

2. U.S. Government demand deposits

3. Other demand deposits

4. Cash items in process

5. Demand deposits due from banks

6. Time deposits

7. Currency and coin

The required reserve is then calculated. The user may then produce a Statement of Reserve Position by entering the reserve and cash position of the bank.

```
                  STATEMENT OF RESERVE POSITION
                   15 days remaining in reserve period

Reserve balance at the close yesterday              72,000.00
   Add collected float to be credited today         13,500.00
                         Subtotal                   85,500.00
Less cash letter                                     3,500.00
                         Subtotal                   82,000.00
Securities collected or purchased       77,000.00
Cash shipped or ordered(-)              25,000.00
Transfers in or out(-)                 -18,000.00
Treasury tax & loan charge             -15,000.00
Other credits or debits(-)              11,000.00   80,000.00
Estimated reserve balance at close today           162,000.00
   Less required reserve                            44,264.00
Indicated reserve excess or deficiency             117,736.00
Prior cumulative excess or deficiency               21,000.00
Cumulative excess or deficiency to date            138,736.00
Cum excess or def. after future transactions       130,536.00
Average for days remaining                           8,702.40
To continue report, press RETURN
```

Program 4

Title: **Arbitrage**
Authors: Dr. P.C. Holman
    Michael Voica
    Janet Bruegl
    University of Wisconsin
    Stevens Point, WI
Memory Requirement: 32K
Statements: 342
Files: 1 ASCII Program
    1 ASCII Data

The November, 1977 exchange rates of 158 principal currencies of the world based on the U.S. dollar are contained in an ASCII data file. The program will allow the user to look at an exchange rate, change an exchange rate, or convert a designated amount from one country's currency to that of another.

```
ENTER THE NO. OF THE COUNTRY WHOSE CURRENCY YOU HAVE
147
NOW ENTER THE COUNTRY'S NAME.
UNITED STATES
ENTER THE NO. OF THE COUNTRY YOU WISH TO CONVERT TO
28
NOW ENTER THE COUNTRY'S NAME.
CHINA
HOW MANY UNITS OF CURRENCY DO YOU WANT EXCHANGED?
2000
          YOU WILL HAVE 3773.58 YUANS
DO YOU WANT TO RUN THIS PROGRAM AGAIN (YES OR NO)
N
```

Program 5

Title: **Moving Average**
Author: Kathy Thurman
    Tektronix, Inc.
    Wilsonville, OR
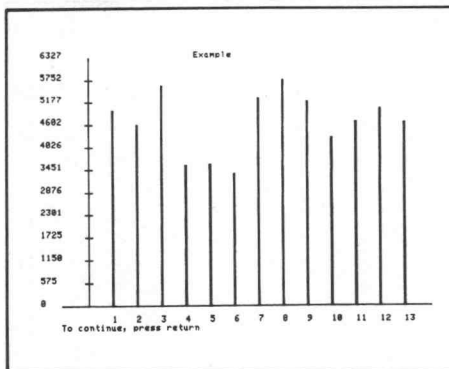Memory Requirement: 8K
Statements: 81
Files: 1 ASCII Program

This program will calculate a moving average of any number of data items. The number of items included in each average may be any size. Averages are displayed serially and in a bar graph.

User inputs:

1. Title for the figures. This will be displayed both on the numeric printout of the averages and on the bar graph.

2. Number of data items to be averaged.

3. Number of data items to be included in each average.

4. All data to be averaged.

No provision is made for changing or storing data.

Program 6

Title: **Single Moving Averages With Graphics**

Author: Dennis R. Heckman
  Tektronix, Inc.
  Wilsonville, OR

Memory Requirement: 24K

Peripherals: Optional-4662 Plotter
  4924 Tape Drive

Statements: 508

Files: 1 ASCII Program

This program is designed to calculate forecasts on time series data corresponding to an intrinsic model:

$$\varepsilon_t = a_o(t) + \varepsilon$$

where $a_o(t)$ is presumed to be a constant and ε represents random error. User-Definable Keys drive the program. Up to 300 data values may be input and this may be expanded if memory options allow.

UDK #1
DATA ENTRY — Initiates the data entry sequence. Data is accepted from keyboard or tape.

UDK #2
CHANGE — Initiates the changing of one data value at an operator-specified item number.

UDK #3
INSERT — Initiates the insertion of a data value at an operator-specified index.

UDK #4
DELETE — Initiates the deletion of a data value at an operator-specified item number.

UDK #5
LIST — Initiates a multi-page list of the current data set.

UDK #6
SET PARM — Initiates selected re-definition of the model's parameters.

UDK #7
FINAL OUTPUT — Selects "final output only" option for printed results of the smoothing computation.

UDK #8
INTERIM OUTPUT — Prints the results, by data item, of the smoothing computations.

UDK #9
PLOT DATA — Scales and displays the raw data.

UDK #10
PLOT PROJ — Draws a solid line representation of the forecast, and draws a solid line representation of the linear fit.

UDK #11
TAPE ENTRY — Initiates the tape data entry sequence.

UDK #15
TAPE OUTPUT — Prints titles, parameters, and the raw data on a previously created (MARKed) file indicated by the operator.

UDK #16
SET LABELS — Initiates titling, X and Y axes labeling, X-axis tic labels.

The computation and plotting of all moving averages is uncentered. Centering the plots by selecting negative forecast intervals will result in erroneous computations.

The same data file structure is used for programs 7 through 12 (below) so data are completely transportable among these programs.

INDUSTRIAL SALES REFUNDS
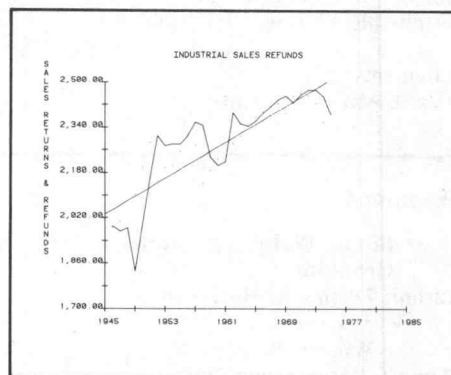
Program 7

Title: **Double Moving Averages With Graphics**

Author: Dennis R. Heckman
  Tektronix, Inc.
  Wilsonville, OR

Memory Requirement: 24K

Peripherals: Optional-4662 Plotter
  4924 Tape Drive

Statements: 520

Files: 1 ASCII Program

This program is designed to calculate forecasts on time series data corresponding to an intrinsic model:

$$\varepsilon_t = a_o(t) + a_1(t) \cdot (t) + \varepsilon$$

where $a_o(t)$ is presumed to be a constant, a_1 is presumed to be a constant value of increase or decrease, and ε represents random error. User-Definable Keys drive the same functions as in program 6.

The computation and plotting of all moving averages is uncentered. Centering the plots by selecting negative forecast intervals will result in erroneous computations.

The same data file structure is used for programs 6 through 12 so data are completely transportable among these programs.

Program 8

Title: **Single Exponential Smoothing With Graphics**

Author: Dennis R. Heckman
  Tektronix, Inc.
  Wilsonville, OR

Memory Requirement: 24K

Peripherals: Optional-4662 Plotter
  4924 Tape Drive

Statements: 508

Files: 1 ASCII Program

This program is designed to calculate forecasts on time series data corresponding to an intrinsic model:

$$\varepsilon_t = a_o(t) + \varepsilon$$

where $a_o(t)$ is presumed to be a constant and ε represents random error. User-Definable Keys drive the same functions as in program 6.

The same data file structure is used for programs 6 through 12 so data are completely transportable among these programs.

Program 9

Title: **Double Exponential Smoothing With Graphics**

Author: Dennis R. Heckman
Tektronix, Inc.
Wilsonville, OR

Memory Requirement: 24K

Peripherals: Optional-4662 Plotter
4924 Tape Drive

Statements: 516

Files: 1 ASCII Program

This program is designed to calculate forecasts on time series data corresponding to an intrinsic model:

$$\varepsilon_t = a_0(t) + a_1(t) \cdot t + \varepsilon$$

where $a_0(t)$ is presumed to be a constant, a_1 is presumed to be a constant value of increase or decrease, and ε represents random error. User-Definable Keys drive the same functions as in program 6.

The same data file structure is used for programs 6 through 12 so data are completely transportable among these programs.

Program 10

Title: **Triple Exponential Smoothing With Graphics**

Author: Dennis R. Heckman
Tektronix, Inc.
Wilsonville, OR

Memory Requirement: 24K

Peripherals: Optional-4662 Plotter
4924 Tape Drive

Statements: 524

Files: 1 ASCII Program

This program is designed to calculate forecasts on time series data corresponding to an intrinsic model:

$$\varepsilon_t = a_0(t) + a_1(t)t + a_2(t)t^2/2 + \varepsilon$$

where $a_0(t)$ is presumed to be a constant, a_1 is presumed to be a constant value of increase or decrease, a_2 is presumed to be a constant value of acceleration or deacceleration, and ε represents random error. User-Definable Keys drive the same functions as in program 6.

The same data file structure is used for programs 6 through 12 so data are completely transportable among these programs.

Program 11

Title: **Single Weighted Averages With Graphics**

Author: Dennis R. Heckman
Tektronix, Inc.
Wilsonville, OR

Memory Requirement: 24K

Peripherals: Optional-4662 Plotter
4924 Tape Drive

Statements: 517

Files: 1 ASCII Program

This program is designed to calculate forecasts on time series data corresponding to an intrinsic model:

$$\varepsilon_t = a_0(t) + \varepsilon$$

where $a_0(t)$ is presumed to be a constant and ε represents random error. User-Definable Keys drive the same functions as in program 6.

The computation and plotting of all moving averages is uncentered. Centering the plots by selecting negative forecast intervals will result in erroneous computations.

The same data file structure is used for programs 6 through 12 so data are completely transportable among these programs.

Program 12

Title: **Double Weighted Averages With Graphics**

Author: Dennis R. Heckman
Tektronix, Inc.
Wilsonville, OR

Memory Requirement: 24K

Peripherals: Optional-4662 Plotter
4924 Tape Drive

Statements: 536

Files: 1 ASCII Program

This program is designed to calculate forecasts on time series data corresponding to an intrinsic model:

$$\varepsilon_t = a_0(t) + a_1(t) \cdot t + \varepsilon$$

where $a_0(t)$ is presumed to be a constant, a_1 is presumed to be a constant value of increase or decrease, and ε represents random error. User-Definable Keys drive the same functions as in program 6.

The computation and plotting of all moving averages is uncentered. Centering the plots by selecting negative forecast intervals will result in erroneous computations.

The same data file structure is used for programs 6 through 12 so data are completely transportable among these programs.

Program 13

Title: Petroleum Risk Analysis I
Authors: Dennis R. Heckman
Tektronix, Inc.
Wilsonville, OR
T.A. Peters
Tektronix, Inc.
Dallas, TX
Memory Requirement: 16K
(24K recommended)
Peripherals: Optional-4662 Plotter
Statements: 450
Files: 1 ASCII Program

The Risk/Analysis program is a Monte Carlo simulation of an undiscounted net profit model which is driven by random numbers operating on cumulative probability distributions of basic data parameters.

This program treats nine petroleum reserve variables stochastically, giving each a triangular distribution based on three values supplied by the users: minimum, most likely, and maximum. For example, porosity might be known to vary within a range of 15% to 25%, but most likely will be near 18%. These values will be input to the Risk Analysis program. The individual porosity used for each iteration will be that calculated with a random number from the cumulative probability distribution defined by the three values.

The other stochastic variables are net pay, area, oil or gas recovery factor, oil or gas saturation, oil formation volume factor or P/Z, gas liquid ratio, oil price, and gas price. Single valued inputs are investment, working and net interests, operating costs, production tax rates, and reservoir temperature.

Operation of the program is simple and straight-forward. The program requests data from keyboard or tape. Corrections or changes (such as that for sensitivity analysis) can be made simply by writing over the value(s) in the machine. Output can be a graphical or tabular record of undiscounted net profit versus cumulative probability of achieving same. Data may be saved to a user-specified file.
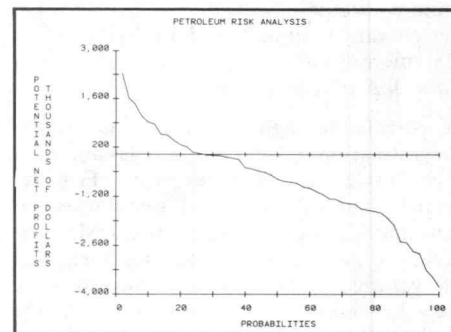
Program 14

Title: Petroleum Economic Analysis I
Authors: Dennis R. Heckman
Tektronix, Inc.
Wilsonville, OR
T.A. Peters
Tektronix, Inc.
Dallas, TX
Memory Requirement: 16K
Peripherals: Optional-4662 Plotter
Statements: 421
Files: 1 ASCII Program

Economic analysis of buying or selling petroleum production or of drilling development wells, is easily accomplished with this program. Fifteen single-valued variables are entered, along with a series of annual oil and gas predicted sales volumes from the keyboard. Results are annual cash flows, cumulative present worths, a rate-of-return on the investment, and a profit-to-investment ratio.

The user decides whether the property is to be evaluated in oil or gas. This decision is important because cost depletion and operating cost is calculated on the basis of oil or gas production. Data values may be modified.

Program 15

Title: Petroleum Water Influx I
Authors: Dennis R. Heckman
Tektronix, Inc.
Wilsonville, OR
T.A. Peters
Tektronix, Inc.
Dallas, TX
Memory Requirement: 24K
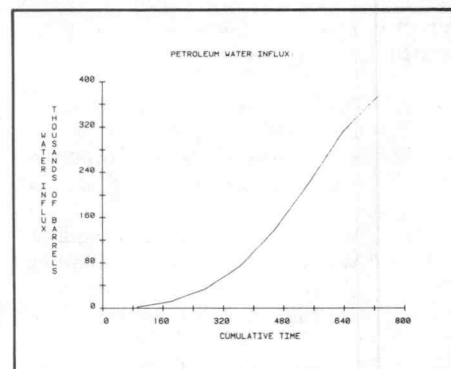Peripherals: Optional-4662 Plotter
Statements: 438
Files: 1 ASCII Program

Estimation of water influx into a petroleum reservoir from an adjacent aquifer is an important calculation to the petroleum engineer. This program permits computation of that influx as a function of time and pressure, for limited or infinite aquifers. The program utilizes the unsteady-state application due to Hurst and Van Everdingen. Additionally, the Brunsetal correlations of dimensionless flow rates with dimensionless time are included.

The proper correlation equations to be used will depend on the value of R_a/R_r ratio which is input. There is a different upper limit to dimensionless flow rate for each of the limited values of R_a/R_r ratio.

Program 16

Title: Oil Reserves
Authors: Dennis R. Heckman
Tektronix, Inc.
Wilsonville, OR
T.A. Peters
Tektronix, Inc.
Dallas, TX
Memory Requirement: 8K
Peripherals: Optional-4641 Printer
Statements: 215
Files: 1 ASCII Program

A petroleum engineering program for the determination of oil-in-place and the total amount of recoverable oil in a reservoir. The reservoir may be a water drive or a gas drive (depletion). Input required includes both reservoir volume and formation properties (rock, fluid, and gas factors). Individual variables may be changed and a new solution obtained without entering all variables.

Program 17

Title: **Gas Reserves**
Authors: Dennis R. Heckman
       Tektronix, Inc.
       Wilsonville, OR
       T.A. Peters
       Tektronix, Inc.
       Dallas, TX
Memory Requirement: 8K
Peripherals: Optional-4641 Printer
Statements: 212
Files: 1 ASCII Program

A petroleum engineer's program for the determination of total in-place gas and total recoverable gas in a reservoir. Features include calculations based upon reservoir size and geologic characteristics. Multiple solutions may be derived without re-entry of all variables. The reservoir pressure base may be chosen for different states of the Federal Power Commission's base.

```
GAS RESERVES: INPUT DATA LIST__
Reservoir Area (acres)                        1267.000
Average Reservoir Thickness (ft)                10.500
Reservoir Pressure (PSIA)                     2429.000
Reservoir Pressure (PSIA) @ Abandonment        300.000
Reservoir Temperature (F)                      177.000
Porosity                                         0.235
Gas Compressibility Factor                       0.853
Gas Compressibility Factor @ Abandonment         0.972
Gas Saturation Factor                            0.750
Louisiana Pressure Base                         15.025
GAS RESERVES: COMPUTATIONS
Gas Volume Factor                            154.713 (scf/cft)

Bulk Volume                               13,303.500 (acre-ft)

Gas Recovery Factor                            0.892

Recoverable Gas                       14,089,231.361 (mcf)

Total Original Gas                    15,801,955.155 (mcf)

Original Gas-in-Place/af                   1,187.804 (mcf/af)

Recoverable Gas-in-Place/af                1,059.062 (mcf/af)
```

Program 18

Title: **Minimum Operating Cost for Two Aircraft**
Author: Florent van Vlasselaer
      Tektronix
      Belgium
Memory Requirement: 8K
Peripherals: 4952 Joystick
         Optional-4662 Plotter
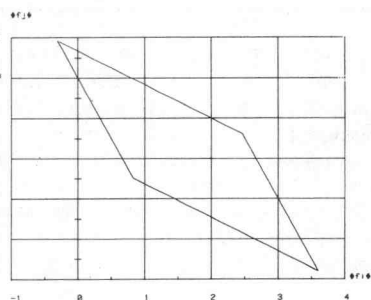Statements: 185
Files: 1 ASCII Program

The program determines all possible mixes of two types of aircraft covering the same route for one week. The constraints are total passengers and cargo and, for each plane, capacity and upper and lower limits of capacity actually used.

	fi= 3 fj= 6	fi= 2 fj= 7	fi= 1 fj= 8	fi= 0 fj=10
annual cost(1016)	1029.6	998.4	967.2	1040.0
Sigma - (%)	62.7	61.5	60.4	53.3
Phi - (%)	53.3	61.5	72.7	88.8

Do you wish to choose some more points ? (yes) or (no) ▪

Inputs: Passengers on route per week
        Cargo on route per week
        Minimum coefficient of occupancy
        Maximum coefficient of occupancy
        Minimum coefficient of loading
        Maximum coefficient of loading
        Seating capacity of plane i
        Seating capacity of plane j
        Cargo capacity of plane i
        Cargo capacity of plane j
        Cost per flight per week plane i
        Cost per flight per week plane j

The output is a parallelogram on the X-Y axes; this output encloses the possible mixes. The operator can then use the joystick to select points for which the annual operating cost will be calculated.

BUSINESS AIDS T2
062-5988-01

BUSINESS AIDS T2 puts at your disposal over 135 routines to apply to your everyday or specialized business and financial problems. Whether you're calculating simple interest or determining consolidated retained income of mutual stock holdings, you should find a formula to fit your needs. The individual abstracts describe each program.

Title/
Previous Abstract #

Business & Accounting Formulas
51/00-0904/0

Mortgage/Loan Payment Table
51/00-0603/0

Loan Schedule for Budgets and Taxes
51/00-0604/0

Mortgage Amortization
51/00-0605/0

Program 1

Title: **Business & Accounting Formulas**
Author: Dr. P.C. Holman

University of Wisconsin
Stevens Point, WI
Memory Requirement: 32K
Statements: 7283
Files: 18 ASCII Program

A tutorial program containing formulas, statistics and tables in the following areas:

1. Simple Interest Formulas: A set of eight formulas used to compute simple interest.

2. Compound Amount Formulas: A set of seven programs determining the dollar amount that an account or loan is worth now, or would be worth at some future time.

3. Annuities: A set of six programs determining the value of an annuity. They handle any kind of annuity, as well as determining what one would have to pay if one set up an annuity.

4. Statistics: Averages and Variation Formulas: A set of 10 programs for solving statistics most commonly used in business.

5. Statistics: A set of 12 programs determining statistical sampling parameters.

6. Statistics: Correlation: A set of 10 programs determining the statistical correlation between sets of data.

7. Statistics: Index Number Formulas: A set of four programs determining the index values for several sets of data.

8. Statistics: Time Series Formulas: A set of six programs determining secular trends, seasonal changes, and cycles. Used to determine what quantity a firm should produce during given periods of time.

9. Inventory Formulas: A set of six programs used for inventory assessment.

10. Depreciation Formulas: A set of nine programs allowing calculation of depreciation.

11. Finance Section: A set of six formulas used for financial analysis.

12. Price Level Adjustments: A set of four programs used to convert long term liabilities (i.e. depreciation, A/P) into current dollar values.

13. Marketing Formulas: A set of four programs used to calculate the selling price a retailer or wholesaler should use to obtain the profit desired.

14. Cost and Production Formulas: A set of 14 programs used to determine the cost and production relationships of various products and payroll billings.

15. Ratio Analysis Formulas: A set of 14 programs presenting basic accounting ratios as well as time periods for such things as production and inventory turn-over, and collection periods for various accounts.

16. Single Entry Formulas: A set of six programs used to determine income statement entries for sales, purchases, expenses, and inventories.

17. Miscellaneous Formulas: A set of nine programs that are useful in business, but that do not belong in the major groupings previously described.

Program 2

Title: **Mortgage/Loan Payment Table**

Author: Tim Giesbers
Tektronix, Inc.
Beaverton, OR

Memory Requirement: 8K

Statements: 112

Files: 1 ASCII Program

The program will compute a table for a mortgage or loan. Each line of the table includes a month, year, payment for the month, interest for the month, principal paid for the month and the balance at the end of the month.

User Prompted Input:

Amount of the mortgage/loan
Interest rate (in percent)
Amount of the payment per month
When payment starts (month and year)
Number of months to be printed in the table

The program will output the number of months it will take to pay off the mortgage/loan and then print the table. The table will be printed with 21 lines per page and requires a carriage return to continue (allowing the user to make a hard copy of the screen if desired).

```
Enter the amount of the mortgage: 1000
Enter the interest rate (in percent): 10
Enter the amount of the payment per month: 100
Payments start when (i.e. '2,80' is February, 1980): 1,80
How many months do you want printed: 12
```

```
Your last payment will be in month no. 11
```

```
**************************************************************
Month      Payment        Interest        Principal        Balance
**************************************************************

JAN 80     $100.00        $8.33           $91.67           $908.33
FEB 80     $100.00        $7.57           $92.43           $815.90
MAR 80     $100.00        $6.80           $93.20           $722.70
APR 80     $100.00        $6.02           $93.98           $628.72
MAY 80     $100.00        $5.24           $94.76           $533.96
JUN 80     $100.00        $4.45           $95.55           $438.41
JUL 80     $100.00        $3.65           $96.35           $342.07
AUG 80     $100.00        $2.85           $97.15           $244.92
SEP 80     $100.00        $2.04           $97.96           $146.96
OCT 80     $100.00        $1.22           $98.78           $48.18
NOV 80     $100.00        $0.40           $99.60           $0.00

**************************************************************

Do you want to run this program again (Y/N)
```

Program 3

Title **Loan Schedule for Budgets and Taxes**

Author: Joe Flicek
W.R. Grace & Co.
New York, NY

Memory Requirement: 8K

Statements: 85

Files: 1 ASCII Program

This program computes a monthly loan schedule with totals for desired budget and/or tax periods. The loan schedule displays for each month of the period the following items:

interest charge
principal payment
total loan payment
ending loan balance

The display also includes the beginning and ending balances, and the total interest charges, total principal payments, and total loan payments for the period covered by the loan schedule.

User prompted input:

beginning loan balance for budget/tax period
interest rate of loan as a decimal
monthly payment on loan
number of months covered by period
year of budget/tax period (final two digits)

For loans that extend over more than one budget or tax period, the program is rerun for each period. The ending loan balance of the first budget or tax period becomes the beginning loan balance of the second period and so forth.

```
LOAN SCHEDULE FOR BUDGETS AND TAXES
USER PROMPTED INPUT FOLLOWS BELOW:

INPUT BEGINNING LOAN BALANCE          20000
INPUT INTEREST RATE AS DECIMAL         .148
INPUT MONTHLY LOAN PAYMENT             300
INPUT NUMBER OF MONTHS FOR PERIOD      12
INPUT YEAR OF LOAN SCHEDULE (TWO DIGITS)  81
```

```
LOAN SCHEDULE FOR 1981
----------------------

Beginning Loan Balance    $     20000.00
                          --------------

MONTH   Interest   Principal   LOAN      Ending
-YEAR   Charge     Payment     Payment   Balance
-----   --------   ---------   -------   -------

1-81    246.67     53.33       300.00    19946.67
2-81    246.01     53.99       300.00    19892.68
3-81    245.34     54.66       300.00    19838.02
4-81    244.67     55.33       300.00    19782.69
5-81    243.99     56.01       300.00    19726.67
6-81    243.30     56.70       300.00    19669.97
7-81    242.60     57.40       300.00    19612.57
8-81    241.89     58.11       300.00    19554.45
9-81    241.17     58.83       300.00    19495.63
10-81   240.45     59.55       300.00    19436.07
11-81   239.71     60.29       300.00    19375.78
12-81   238.97     61.03       300.00    19314.75
        --------   -------     -------
Total   2914.75    685.25      3600.00

Ending Loan Balance      $     19314.75
                         --------------
```

Program 4

Title: **Mortgage Amortization**

Author: Ronald C. Robinder
        Tektronix, Inc.
        Beaverton, OR
Memory Requirement: 8K
Statements: 62
Files: 1 ASCII Program

The program will calculate an amortization table for loans such as home mortgages.

You are prompted for the term of the loan, the principal amount, and the interest rate.

The program will return with the monthly payment. A pause allows you to interact for correction, copying, or terminating the execution.

After the pause, the program will display the repayment schedule in two year segments. A pause between each page allows you to copy, restart, quit or continue.

```
HOW LONG (IN YEARS) IS THE LOAN? 12
HOW MUCH IS BEING BORROWED? 20000
HOW HIGH IS THE INTEREST (IN %)? 14.8
YOUR MONTHLY PAYMENT WILL BE $ 297.61
```

MONTH	PRINCIPAL	INTEREST	BALANCE
1	$ 50.94	$ 246.67	$ 19,949.06
2	$ 51.57	$ 246.04	$ 19,897.49
3	$ 52.21	$ 245.40	$ 19,845.28
4	$ 52.85	$ 244.76	$ 19,792.43
5	$ 53.50	$ 244.11	$ 19,738.93
6	$ 54.16	$ 243.45	$ 19,684.77
7	$ 54.83	$ 242.78	$ 19,629.94
8	$ 55.51	$ 242.10	$ 19,574.43
9	$ 56.19	$ 241.42	$ 19,518.24
10	$ 56.89	$ 240.72	$ 19,461.35
11	$ 57.59	$ 240.02	$ 19,403.76
12	$ 58.30	$ 239.31	$ 19,345.46
13	$ 59.02	$ 238.59	$ 19,286.44
14	$ 59.74	$ 237.87	$ 19,226.70
15	$ 60.48	$ 237.13	$ 19,166.22
16	$ 61.23	$ 236.38	$ 19,104.99
17	$ 61.98	$ 235.63	$ 19,043.01
18	$ 62.75	$ 234.86	$ 18,980.26
19	$ 63.52	$ 234.09	$ 18,916.74
20	$ 64.30	$ 233.31	$ 18,852.44
21	$ 65.10	$ 232.51	$ 18,787.34
22	$ 65.90	$ 231.71	$ 18,721.44
23	$ 66.71	$ 230.90	$ 18,654.73
24	$ 67.53	$ 230.08	$ 18,587.20

CAD T1
062-5976-01

CAD T1 is a tape collection of eight programs which will help you transform sketches into finished drawings, digitize drawings, create engineering symbols, and other designs. Two programs interact with a host to incorporate designs in PLOT 10 and NASTRAN programs. The individual abstracts describe each program.

Title/
Previous Abstract #

Drafting Digitizer
51/00-9543/0
POINT Mode Digitize
52/07-9547/0
Draw
51/00-8021/0
Digitize and Draw
51/00-9520/0

3-D Transformation Using Homogeneous Coordinates
51/00-9527/0
SYMBOLGEN
51/00-9536/0
Performance Prediction of Sailcraft
51/00-1606/0
NASTRAN Deck Generator for Electronic Enclosure Analysis
51/00-9528/0

Program 1

Title: **Drafting Digitizer**

Author: Tom Sutherlin
        Cameron University
        Lawton, OK
Memory Requirement: 16K
Peripherals: 4662 Plotter
        Optional — 4956 Tablet
Statements: 407
Files: 2 ASCII Program

The program consists of two files; the menu and the digitizer.

The menu is designed to be plotted on the 4662 Plotter. This is then placed on the 4956 Tablet to be used by the digitizer. The menu allows a blank area for sketching and digitizing with the basic symbols shown.

The digitizer allows the user to transform sketches into a finished drawing using the basic symbols selected from the menu. Input is from the 4956 Tablet, but may be easily modified to allow input from the 4662 Plotter. The User-Definable Keys are used to select the screen or the plotter for output.

200 X and Y coordinates may be input. For machines with more than 16K memory the program may be modified to accept additional X,Y coordinates.

Menu selections include:

Line — input points A and B, a line will be drawn between the two points

Hidden Line — same as Line, but draws a dashed line

Center Line — input points A and B, a dash .15 inches long will be drawn at the center distance of the line

Circle — input point A (center) and B (right of center), used as radius to compute and draw circle

Hidden Circle — same as Circle, but draws dashed circle

Partial Arc — input points A, B, and C, calculates distance between A and B for radius, length is angle calculated between AB and BC

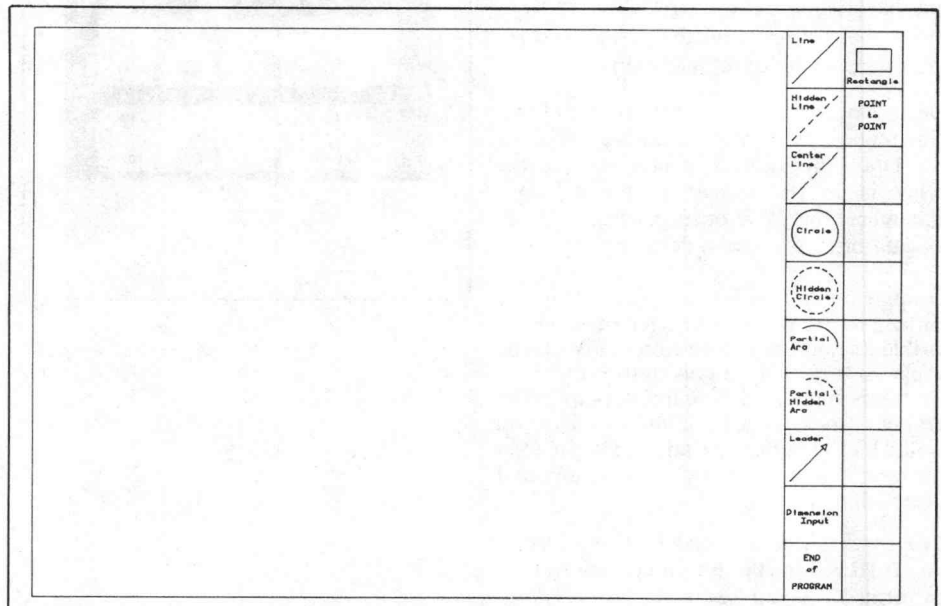Partial Hidden Arc — same as Partial Arc, but draws a dashed line arc

Leader — input points A and B, draws arrowhead at point A .07 inches wide and .1 inches long with line to B

Dimension Input — input points A and B (to the right), enter dimension from the keyboard (up to 16 alphanumeric characters) data is output in a horizontal position

End of Program — flashed "PROGRAM TERMINATED" on the screen and ends digitizing input

Rectangle — input points A (lower left corner) and B (upper right corner), calculates the length of the horizontal and vertical sides

Point-To-Point — input points A, B, C, D . . . , will draw straight line segments to connect the points, points may be at any position

Program 2

Title: **POINT Mode Digitize**

Author: Craig Bulmer
Tektronix, Inc.
Chicago, IL

Memory Requirement: 32K (64K
Optimum)

Peripherals: 4956 Tablet
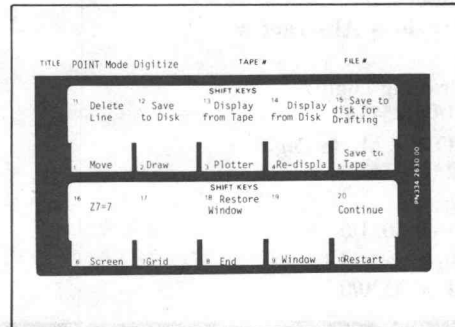Optional-4662/4663 Plotter
4907 File Manager

Statements: 355

Files: 1 ASCII Program
Requires pre-marked data files

This program allows you to digitize a drawing on the 4956 Tablet in POINT mode using the Writing Pen. The data format on disk is compatible for use with "4052/4 Drafting Program."

User-Definable Keys invoke the routines. As you are digitizing, the drawing is reproduced on the 4050 Screen. Lines may be deleted from your drawing. The

completed drawing may be re-displayed, or continued. The drawing may be saved to tape or disk and recalled from either.

A grid structure coupled with a ZOOM windowing routine helps you choose your window.

Program 3

Title: **Draw**

Author: Wade H. Nelson
GTE
Huntsville, AL

Memory Requirement: 16K

Statements: 860

Files: 2 ASCII Program (1 w/REM)
1 ASCII Data
1 Binary Data (examples)
Tape requires pre-marked data file

The program rapidly produces and edits graphic designs. The User-Definable Keys move the cursor about the screen and initiate various graphic operations.

Designs may be stored on tape in one of two data modes. The first is for reading back into the Draw program at a later session; the other is in the format of BASIC data statements for use in other programs, either as data or to produce a desired picture.

Graphic operations are two-part; that is, are defined by two points connected either with a visible line or a non-visible move. While the program is running, a plus sign (+) indicates the last point moved to, or line drawn to. The graphic cursor is used to indicate where you would like a graphic operation to begin, or in the most basic operations, such as move and draw a line, to end.

These two points are saved when information is to be typed in for an operation to be performed. As an example, the program

prompts for the height and width of an ellipse to be drawn. Prior to prompting, the cursor is moved to the top left of the screen, and earlier lines skipped over. The cursor is returned to its original position prior to execution of any graphic operation.

You may change the cursor displacement value used by UDK's 1-4.

Program 4

Title: Digitize and Draw

Author: Dr. R.J. Reimann
Physics Dept.
Boise State University
Boise, ID

Memory Requirement: 8K
Peripherals: Optional-4662 Plotter
Statements: 175
Files: 1 ASCII Program

Tape requires pre-marked data files

This program enables the user to easily draw figures or trace transparencies placed on the 4050 screen. The User-Definable Keys are incorporated to move the cursor horizontally, vertically and diagonally, and digitize and store the selected points. The slope of diagonal movement may be altered. User-Definable Keys also rotate the figure about a central axis, draw the figure and allow additions to the figure. Minimum resolution approximates that of the graphic display itself.

The points are stored in a binary data file for each stage of the drawing. Accumulated files are automatically linked together to reproduce the drawing. Output may be made to the screen or 4662 Plotter.
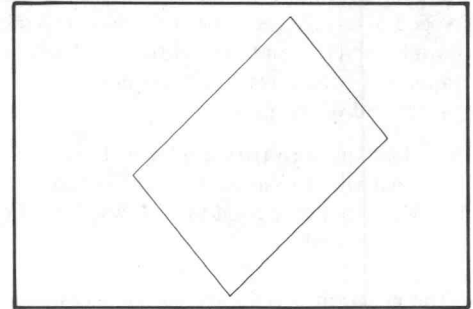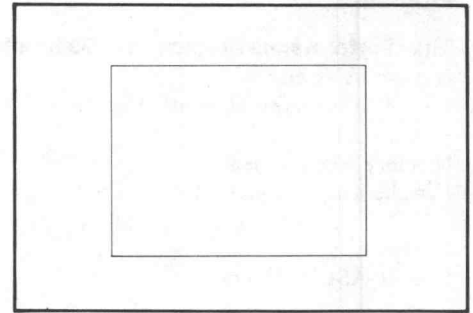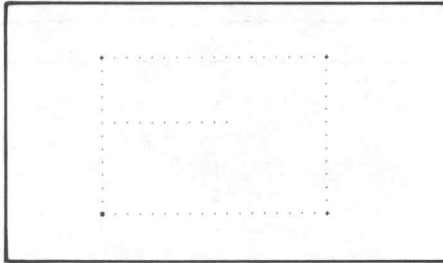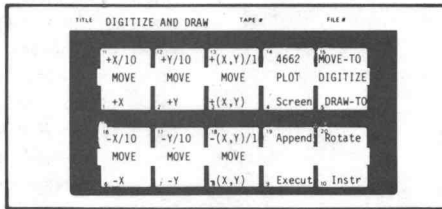
Program 5

Title: 3-D Transformation Using Homogeneous Coordinates

Author: George E. Heckler
Department of Chemistry
Idaho State University
Pocatello, ID

Memory Requirement: 24K
Statements: 339
Files: 1 ASCII Program

The program displays two straight sided 3-D figures on the screen. On the left is the original figure; the points at the corners of the original are transformed by a 4 x 4 matrix and displayed on the right. The transforming matrix, and coordinates of illustrative points, are also displayed. The matrix multiplication uses homogeneous coordinates.

The figure is changed in data statements.
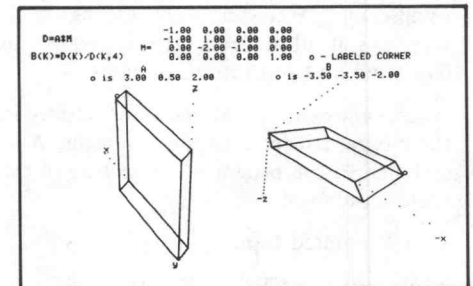
Program 6

Title: SYMBOLGEN

Author: E.J. Moran
GTE AE Laboratories
Northlake, IL

Memory Requirement: 16K
Peripherals: 4952 Option 2 Joystick
Option 1 Data Communications Interface
Statements: 359
Files: 1 ASCII Program

Tape requires pre-marked data file

SYMBOLGEN converts symbols "digitized" on the 4050 graphic screen to x,y coordinates, encodes these coordinates in TEKTRONIX PLOT 10 graphic language "calls", and affixes a preamble to the calls. This forms a complete PL/I procedure which is sent to the IBM 370 (303X) host over the 4050 Option 1 Data Communications Interface. The program is now ready to be called by a PL/I main procedure for drawing and for digitizing drawings made up of the sketched symbols.
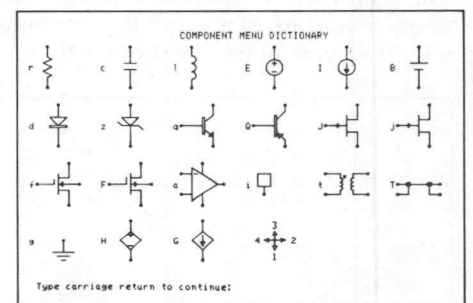
How it works on the 4050: SYMBOLGEN displays a 10 x 10 grid (100 points) on the 4050 graphic screen. Using the 4952 Option 2 Joystick and a menu of commands, the designer sketches the symbol on the screen. When the sketch is completed, the user is prompted for the textual information to define the procedure name, and for any other appropriate data that may be fixed when the program is called to draw the symbol.

Menu of commands:

m: Move to the pointed-to location from the last pointed-to location without drawing a line.

d: Draw to the pointed-to location from the last pointed-to location.

t: Draw a "terminal" (small diamond) around the pointed-to location.

a: Draw an arc of specified segment lengths (in degrees) and radius, starting at the pointed-to location from a given angle to a second given angle.

l: Locate the coordinates of a "label" at the pointed-to location and enter a single character prefix for the label.

e: End the sketch: fetch the required procedure textual data and send the PL/I program to the host computer.

Applications: SYMBOLGEN was used to generate a set of 24 symbol routines for graphic symbols used in constructing an analog electronic circuit schematic drawing. SYMBOLGEN was also used to generate block letters for title pages of some applications programs in PL/I. With revision, the program can be made to produce FORTRAN or other language symbol drawing routines.

Program 7

Title: **Performance Prediction of Sailcraft**
Author: Alex Gares
University of South Florida
Tampa, FL
Memory Requirement: 32K
Peripherals: Optional—4641 Printer
4662 Plotter
Statements: 589
Files: 1 ASCII Program

The program allows the user to predict the speed of any sailing craft with respect to the wind velocity and angel to the true or apparent wind direction Polar diagrams are generated of the ratios of:

Boat speed to true wind speed
Boat speed to apparent wind speed
Velocity made good to windward to true wind speed

The program permits the sailboat designer, handicapper or performance sailor to evaluate fully the effect of the various significant parameters on sailing craft velocities at all angles to the apparent and true wind and generate polar plots.

A test routine for a catamaran is included in the program to demonstrate the output. Also included in the program is a picture of the vectors involved.

User Prompted Input:

Sail area in FT 2
Sail lift coefficient
Sail drag coefficient
Waterline length in FT
Waterline length from bow to widest beam in FT
Displacement in LBS
Prismatic coefficient
Hull drag force at 3.16 knots in LBS
True wind velocity in knots
Angle between true wind and boat velocity in degrees

The program is a result of a senior level engineering research project and stems from a study of over 20 references in the field.

THE SAILING TRIANGLE

```
TEST CASE FOR A CATAMARAN HULL
THE FOLLOWING VALUES WILL BE USED FOR THE TEST CASE
SAIL AREA=1425 FT†2
SAIL LIFT COEFFICIENT=1.0
SAIL DRAG COEFFICIENT=0.2
WATERLINE LENGTH=35 FT.
WATERLINE LENGTH FROM BOW TO WIDEST BEAM =19 FT
DISPLACEMENT =23001 LBS.
PRISMATIC COEFFICIENT =0.75
HULL DRAG AT 3.16 KNOTS =61 LBS.
TRUE WIND VELOCITY =15 KNOTS
HIT 1 FOR COMPLETE POLAR DIAGRAMS, HIT 2 IF NOT.
```
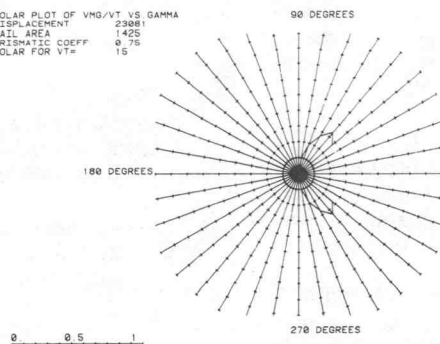

POLAR PLOT OF VB/VT VS GAMMA
DISPLACEMENT 23001
SAIL AREA 1425
PRISMATIC COEFF 0.75
POLAR FOR VT= 15
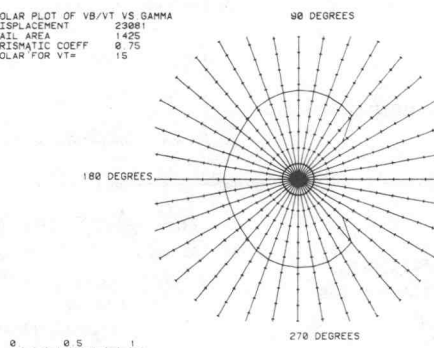
POLAR PLOT OF VB/VA VS GAMMA
DISPLACEMENT 23001
SAIL AREA 1425
PRISMATIC COEFF 0.75
POLAR FOR VT= 15
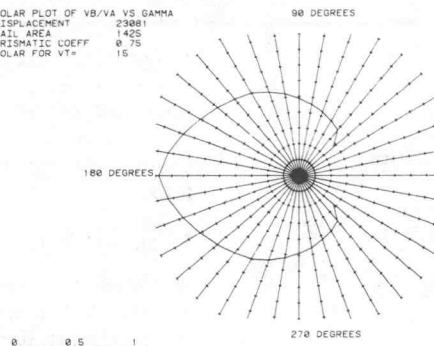
POLAR PLOT OF VMG/VT VS GAMMA
DISPLACEMENT 23001
SAIL AREA 1425
PRISMATIC COEFF 0.75
POLAR FOR VT= 15

Program 8

Title: **NASTRAN Deck Generator for Electronic Enclosure Analysis**

Author: Erwin Vogel
Fairchild Industries
Germantown, MD

Memory Requirement: 32K

Peripherals: RS-232 Data Communications Interface
Host w/NASTRAN Software
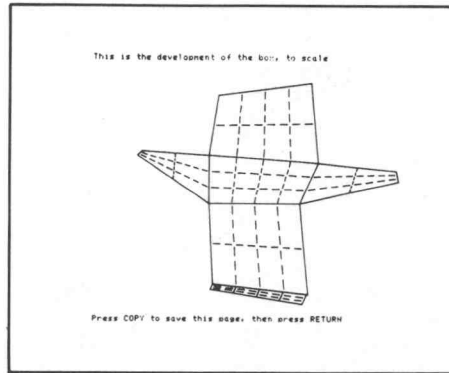
Statements: 1029

Files: 2 ASCII Program
1 New
First 3 files or recode 4 lines

This is the development of the box, to scale

Press COPY to save this page, then press RETURN

An interactive tutorial program creates three-dimensional models for structural analysis.

The engineer enters 12 coordinates specifying the corners of any rectangular or skew box. Each panel is subdivided and the material types and thickness for each keyed in. Number and location of cutouts, number and weight of concentrated masses for each panel along with support pins and locations are input. No negative numbers are allowed.

The program calculates the data, formats it to NASTRAN requirements and writes it to tape. The data may then be transmitted over the RS-232 to the host computer where bulk data and JCL cards are automatically keypunched.

The program's step-by-step graphic tutorial prompting enables the engineer without computer experience to use it with ease.

CAD D1
062-5977-01

CAD D1 contains programs to help you design an infinite variety of structures or draft complicated layouts. You could incorporate the transformation algorithm into your own programs. One program will even predict the performance of any sail craft you may have on your drawing board. The individual abstracts describe each program.

Title/
Previous Abstract #

4052/4 Drafting Program
52/07-9538/0

Telephone Cable Layout
51/07-3302/0

Drafting Digitizer
51/00-9543/0

POINT Mode Digitize
52/07-9547/0

3-D Transformation Using Homogeneous Coordinates
51/00-9527/0

Performance Prediction of Sailcraft
51/00-1606/0

Program 1

Title: **4052/4 Drafting Program**
Author: Connie Breithaupt
 Tektronix, Inc.
 Rockville, MD
Memory Requirement: 64K
Peripherals: 4052 Graphic System, Opt. 24
 4907 File Manager
 4952 Joystick, Opt. 2
 or
 4054 Graphic System, Opt. 24
 4907 File Manager
 Optional-4662/4663 Plotter
 4956 Tablet

Statements 2321
Files: 2 Program
 7 Data (examples)
 Requires data files

The program allows a drawing to be defined by creating, modifying, and/or deleting its elements. The elements may be arrows, circles, lines, text, cross-hatching, and sub-drawings. The created drawing is called a Picture Data Base (PDB) and is stored on the 4907 File Manager. Each PDB may contain 100 different layers of display. For example, Layer 1 (the default layer) may show the PDB outline, Layer 2 the dimensions, Layer 3 the linework, etc. A frequently used symbol may be created as a PDB-and then used as a Sub-PDB in other PDB's.

Program commands include:

CHANGE Grid points
  Layer Number
Dash line font
Height of text **END**

COMPRESS

DISPLAY
All of current PDB

ERASE
Arrow(s)
Circle(s)
Line(s)
Sub-PDB(s)
Text
Cross-hatchings(s)

INSERT

Arrow-horizontal
Arrow-vertical
Circle
Line
Sub-PDB
Text
Cross-hatching

LIST
Parameters-selectable
PDB-contents
PAGE

Down
Left
Right
Up

PAUSE

RESTART

SAVE

SELECT

Angle-text
Arrowhead size
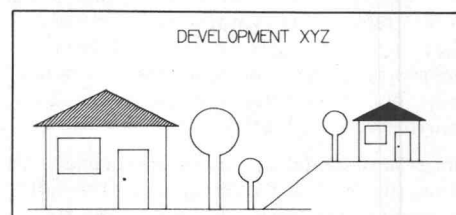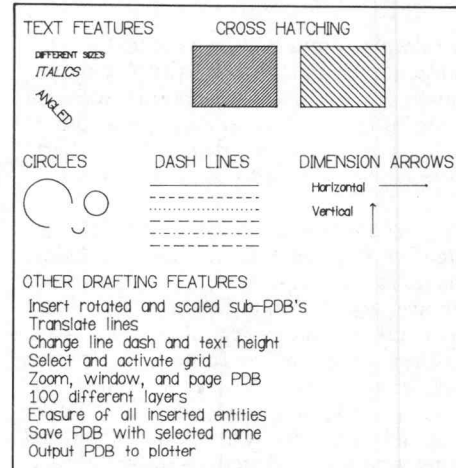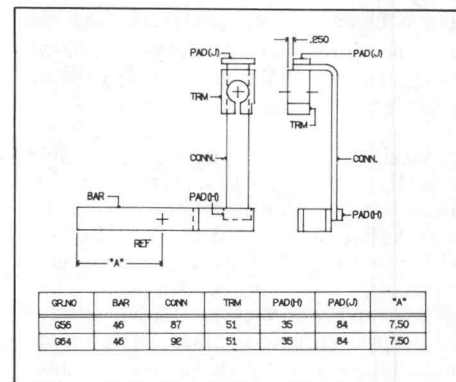Dash code

Figure (Sub-PDB)
Grid interval
Grid off
Grid on
Height-text
Input device address
Non-italic text
Italic text
Tolerance range
Translation-amount
Window
Cross-hatching-angle, line
displacement
Layer number
Output device address

TRANSLATE

Line-copies n times,
increment, direction

ZOOM
All
Down
Up
Window

GR.NO	BAR	CONN	TRM	PAD(H)	PAD(J)	"A"
G56	46	87	51	35	84	7.50
G64	46	92	51	35	84	7.50

TEXT FEATURES   CROSS HATCHING
DIFFERENT SIZES
ITALICS
ANGLED

CIRCLES   DASH LINES   DIMENSION ARROWS
 Horizontal
 Vertical

OTHER DRAFTING FEATURES
Insert rotated and scaled sub-PDB's
Translate lines
Change line dash and text height
Select and activate grid
Zoom, window, and page PDB
100 different layers
Erasure of all inserted entities
Save PDB with selected name
Output PDB to plotter

DEVELOPMENT XYZ

Program 2

Title: **Telephone Cable Layout**
Author: Len Olson
  Tektronix, Inc.
  Rockville, MD
Memory Requirement: 32K 4051

Peripherals: 4907 File Manager
  4956 Graphic Tablet
  4663 Plotter
  4641 Printer

Files: 48 Program
Statements: 4500

A unique package allows the user to 1) draft telephone cable staking sheets, and 2) inventory parts for the resulting cable network.

However, the basic idea of this software (a skeleton basic road to which are added symbols, text, side roads, etc.) could be extended in a straightforward way to any layout or utility type problem. For example, a factory layout which would have a basic column grid replacing the basic road, an office layout, airplane seating layout, TV cable or any utility layout, etc.

The staking sheets are composed and edited by adding or deleting discrete elements rather than inserting or deleting moves and draws within objects. A Basic Road Library and Symbol Library constructed by the user provide a reservoir of standard road segments and constant symbols. Meter location details, variable symbols, cable layout and annotations complete the staking sheet elements.

The graphic input may come from the 4956 Tablet or the 4663 Plotter. Graphic output may be sent to the 4050 Series graphic screen or 4663 Plotter. The user may choose one of four colors for each element. The parts inventory list is sent to the 4641 Printer.

Four programs help the user do the job. The **Digitizer Program** initiates the 4956 Tablet and helps the user construct the Basic Road Library and Symbol Library. The Basic Road Library is a collection of basic roads digitized in centerline format (alternating arcs using three points) and straight line segments. The program calculates the curb lines and rights-of-way lines which are stored along with the road sections in the Library. The Symbol Library contains digitized and named relocatable symbols or subpictures. They are stored as sequences of relative moves and draws. The basic road segments or symbols may be deleted as well as added to their respective libraries.

Once the two Libraries are set up, through 48 commands the user interacts with the **Edit Program** to compose, edit and display staking sheets. The user chooses a basic road

section and locates it on the plotter screen. The program will prompt for meter-location information.

side roads

  meter location of intersection of center lines
  intersection angle
  whether road is above only, below only, or both

symbols

  meter location
  "Y" location
  symbol name
  angle w.r.t. center line

pedestals

  meter location
  pedestal symbol type
  location relative to right-of-way lines

variable symbols

  start and end (fences, etc.)

The above four types of entries may be deleted or moved.

The compass symbol with orientation is displayed, and curb lines for side roads are drawn. Editing, moving, adding or deleting any element may be done at this point.

Cable layout and nonsymmetric landmarks such as rivers are digitized from the 4956. When annotation is keyed in, the information is complete. A final editing may be done and the plot completed on the 4663 along with the title block. Partially completed staking sheets may be edited also.

Each job has a Master Parts List and a Master Cable List. The **Information Entry Program** allows the user to add part names, cable type, and construction units. Information for individual staking sheets such as Designation Standards, Meter Reading of Pedestals, and construction units and lengths of cables may be input also.

The **Summary Report Program** generates a report of the part names and quantities, the cable types and lengths, for all sheet numbers or a given sheet number of a given job. Output may be to the graphic screen or the 4641 Printer.

Program 3

Title: **Drafting Digitizer**

Author: Tom Sutherlin
   Cameron University
   Lawton, OK
Memory Requirement: 16K
Peripherals: 4662 Plotter
   Optional — 4956 Tablet
Statements: 407
Files: 2 Program

The program consists of two files; the menu and the digitizer.

The menu is designed to be plotted on the 4662 Plotter. This is then placed on the 4956 Tablet to be used by the digitizer. The menu allows a blank area for sketching and digitizing with the basic symbols shown.

The digitizer allows the user to transform sketches into a finished drawing using the basic symbols selected from the menu. Input is from the 4956 Tablet, but may be easily modified to allow input from the 4662 Plotter. The User-Definable Keys are used to select the screen or the plotter for output.

200 X and Y coordinates may be input. For machines with more than 16K memory the program may be modified to accept additional X,Y coordinates.

Menu selections include:

Line — input points A and B, a line will be drawn between the two points

Hidden Line — same as Line, but draws a dashed line

Center Line — input points A and B, a dash .15 inches long will be drawn at the center distance of the line

Circle — input point A (center) and B (right of center), used as radius to compute and draw circle

Hidden Circle — same as Circle, but draws dashed circle

Partial Arc — input points A, B, and C, calculates distance between A and B for radius, length is angle calculated between AB and BC

Partial Hidden Arc — same as Partial Arc, but draws a dashed line arc

Leader — input points A and B, draws arrowhead at point A .07 inches wide and .1 inches long with line to B

Dimension Input — input points A and B (to the right), enter dimension from the keyboard (up to 16 alphanumeric characters) data is output in a horizontal position

End of Program — flashed "PROGRAM TERMINATED" on the screen and ends digitizing input

Rectangle — input points A (lower left corner) and B (upper right corner), calculates the length of the horizontal and vertical sides

Point-To-Point — input points A, B, C, D . . . , will draw straight line segments to connect the points, points may be at any position

Program 4

Title: **POINT Mode Digitize**

Author: Craig Bulmer

   Tektronix, Inc.

   Chicago, IL

Memory Requirement: 32K (64K Optimum)

Peripherals: 4956 Tablet

   Optional-4662/4663 Plotter

   4907 File Manager

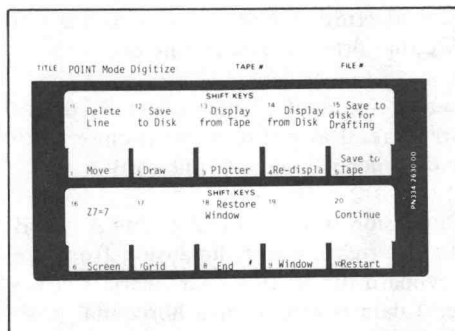Statements: 355

Files: 1 Program

   Requires pre-marked data files

This program allows you to digitize a drawing on the 4956 Tablet in POINT mode using the Writing Pen. The data format on disk is compatible for use with "4052/4 Drafting Program."

User-Definable Keys invoke the routines. As you are digitizing, the drawing is reproduced on the 4050 Screen. Lines may be deleted from your drawing. The completed drawing may be re-displayed, or continued. The drawing may be saved to tape or disk and recalled from either.

A grid structure coupled with a ZOOM windowing routine helps you choose your window.

Program 5

Title: **3-D Transformation Using Homogeneous Coordinates**

Author: George E. Heckler

   Department of Chemistry

   Idaho State University

   Pocatello, ID

Memory Requirement: 23K

Statements: 339

Files: 1 Program

The program displays two straight sided 3-D figures on the screen. On the left is the original figure; the points at the corners of the original are transformed by a 4 x 4 matrix and displayed on the right. The transforming matrix, and coordinates of illustrative points, are also displayed. The matrix multiplication uses homogeneous coordinates.

The figure is changed in data statements.
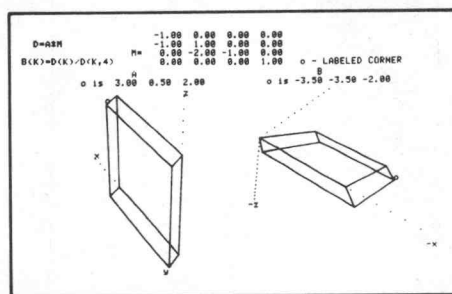
Program 6

Title: **Performance Prediction of Sailcraft**
Author: Alex Gares
          University of South Florida
          Tampa, FL
Memory Requirement: 32K
Peripherals: Optional—4641 Printer
                     4662 Plotter

Statements: 589
Files: 1 Program

The program allows the user to predict the speed of any sailing craft with respect to the wind velocity and angel to the true or apparent wind direction Polar diagrams are generated of the ratios of:

    Boat speed to true wind speed
    Boat speed to apparent wind speed
    Velocity made good to windward to true
    wind speed

The program permits the sailboat designer, handicapper or performance sailor to evaluate fully the effect of the various significant parameters on sailing craft velocities at all angles to the apparent and true wind and generate polar plots.

A test routine for a catamaran is included in the program to demonstrate the output. Also included in the program is a picture of the vectors involved.

User Prompted Input:

    Sail area in FT   2
    Sail lift coefficient
    Sail drag coefficient
    Waterline length in FT
    Waterline length from bow to widest beam in FT
    Displacement in LBS
    Prismatic coefficient
    Hull drag force at 3.16 knots in LBS
    True wind velocity in knots
    Angle between true wind and boat velocity in degrees

The program is a result of a senior level engineering research project and stems from a study of over 20 references in the field.


```
TEST CASE FOR A CATAMARAN HULL
THE FOLLOWING VALUES WILL BE USED FOR THE TEST CASE
SAIL AREA=1425 FT↑2
SAIL LIFT COEFFICIENT=1.0
SAIL DRAG COEFFICIENT=0.2
WATERLINE LENGTH=35 FT.
WATERLINE LENGTH FROM BOW TO WIDEST BEAM =19 FT
DISPLACEMENT =23081 LBS.
PRISMATIC COEFFICIENT =0.75
HULL DRAG AT 3.16 KNOTS =61 LBS.
TRUE WIND VELOCITY =15 KNOTS
HIT 1 FOR COMPLETE POLAR DIAGRAMS, HIT 2 IF NOT.
```
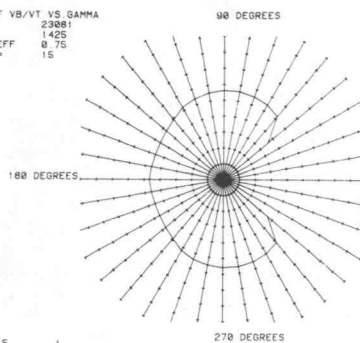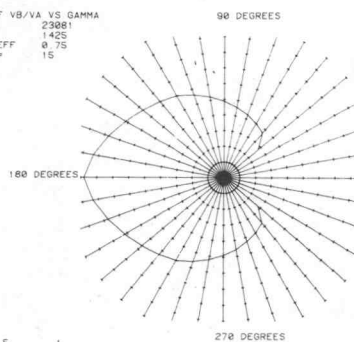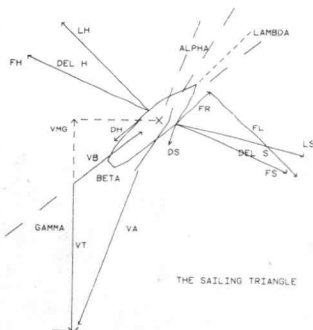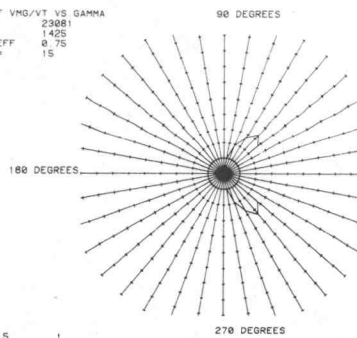
CHARACTER GENERATOR T1
062-5951-01

CHARACTER GENERATOR T1 is a tape collection of eight software character generator programs. A variety of letter styles is represented as well as various degrees of interactivity. The individual abstracts describe each program.

Use these programs to generate posters, signs, and other visual aids. Or incorporate them within other programs for labeling routines.

Title/
Previous Abstract #

Super Font
52/00-8046/0
Leroy Characters
51/00-8012/1
Variable Fonts
51/00-8040/0
Software Characters #1
51/00-8006/0
Variable Size Screen Characters
51/00-8016/0
Software Characters #2
51/00-8020/0
Spider's Web Characters
51/00-8036/0
3-D Name Plot
51/00-9505/0

Program 1

Title: **Super Font**
Author: Jon C. Mutton
Tektronix, Inc.
Wilsonville, OR

Memory Requirement: 64K
Peripherals: Optional-4662/4663 Plotter
Statements: 866
Files: 2 ASCII Program
17 ASCII Data

You may use 14 different character fonts, three symbol fonts and several composing modes to produce a sign or message. The display is previewed on the 4052/54 screen, then copied or sent to the 4662/4663 Plotter. The character fonts include:

Gothic Light
Gothic Medium
Greek Gothic
Script Light
Script Medium
Roman Medium
Roman Bold
Roman Italic Medium
Roman Italic Bold
Old English
Cyrillic
German
Italian

The three symbol fonts contain a total of 217 symbols

Composing begins by entering the text, a line at a time, the User-Definable Keys are employed to position the lines, scale the text, change the font, display the message on the screen or output it to the plotter. The message may also be saved on tape.

Each line may be right, left or center justified. Or a line may be moved up, down, right or left and "fixed" where desired. Each line of characters may be scaled to the desired size. You may change pen colors as each line is output to the plotter. An editing routine lets you add, change, or delete text.

SUPER FONT
14 Fonts
217 Symbols
Text Placement
Choose Your Size

Program 2

Title: **Leroy Characters**
Author: Mark Mehall
       Tektronix, Inc.
       Wilsonville, OR
Memory Requirement: 16K
Peripherals: Optional-4662 Plotter
Statements: 216
Files: 1 ASCII Program
     1 Binary Data

This set of routines draws English and Greek upper and lower case letters, numbers, special characters, and centered symbols on a 4050 or 4662. The characters and symbols can be any size, at any angle and may be positioned at any location on the screen or plotter surface. Since the routines do not interfere with the user's window and viewport, they can be used with existing programs for annotation. Labels can be placed on axes, points can be indicated, and legends can be added to graphs. There are 211 different symbols available. The routines also offer subscripts and superscripts, underlining, italics, tab settings, backspace and carriage return functions. The characters are similar to the Leroy style.

Example programs are included in the documentation.

Program 3

Title: **Variable Fonts**
Author: William R. Sebra
       U.S. AMSAA
       Aberdeen Proving Ground, MD
Memory Requirement: 32K
Peripherals: Optional-4662 Plotter
Statements: 331
Files: 1 ASCII Program
     8 Binary Data

The program produces a page of text, oriented in either a horizontal or vertical format, of high quality drawn characters suitable for projection as a presentation aid. Four fonts are available in various sizes for the text:

    Roman
    Roman Italic
    Gothic
    Script

Each line of text can have a different character size and a different margin selection (centered, right or left justified). The text is automatically centered on the page by the program. Output may be to the screen or the 4662 Plotter.

Program 4

Title: **Software Characters #1**

Author: LeRoy Nollette
   Tektronix, Inc.
   Wilsonville, OR
Memory Requirement: 16K
Peripherals: Optional-4662 Plotter
Statements: 203
Files: 1 ASCII Program
   Requires pre-marked work file

An interactive program that allows the user to specify the rotation, rotation increment, character height, character width, starting X location, starting Y location and a character string. It then writes a program on tape which will draw that string. When the program generation for a string is completed the user can choose to define another string or to close the file. When the file is closed, it OLDS in the newly created program and runs it. By changing one line in the newly generated program its output can be directed to the 4662 Plotter. The characters are A-Z; 0-9; ",";"-";"."; "/".

Program 5
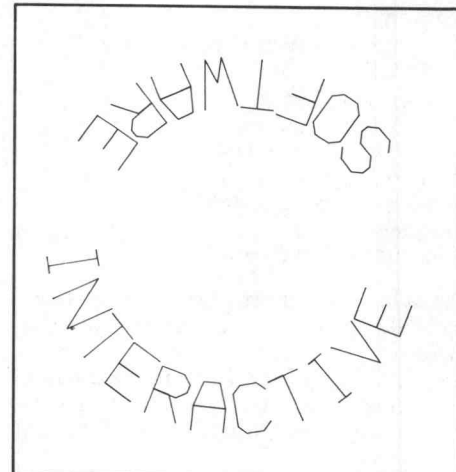
Title: **Variable Size Screen Characters**
Author: Keith S. Reid-Green
   Educational Testing Service
   Princeton, NJ
Memory Requirement: 8K
Statements: 53
Files: 1 ASCII Program

Use this subroutine to generate characters of variable size to be displayed on the 4050 screen. This technique is useful when displaying textual information which will subsequently be plotted in other than the standard character size.

User input:

   Character size X,Y
   Output coordinates X,Y
   Character string

The subroutine converts all letters, numbers and the characters "[","]","and "." to strokes.

Enter character size x,y: 5,5
Enter output coordinates x,y: 0,80
Enter character string: TEKTRONIX

TEKTRONIX

Program 6

Title: **Software Characters #2**
Author: Trevor Blogg
   3650 21st Street NE
   Calgary, Alberta, Canada
Memory Requirement: 8K
Peripherals: Optional-4662 Plotter
Statements: 45 Program
   76 Example Program
Files: 1 ASCII Program
   1 ASCII Program Example
   1 ASCII Data

A subroutine with a memory overhead of 3K which permits the plotting of a limited character set, i.e., upper case, numerics, common symbols and 1 special plotting character ⌀. Character size is determined by the existing scaling factor; they are rotated to the current graphic rotation.

String variables are "printed" with proportional spacing. Normal aspect ratio is achieved with equal X and Y scaling factors. The routine uses a data list on tape which is accessed once at the beginning of the user program.

This character generator allows a programmer to add titles, rotated labels, etc., to plots. If the hard copy device is a 4662 Plotter, the device address may be added to the RMOVE and RDRAW commands.
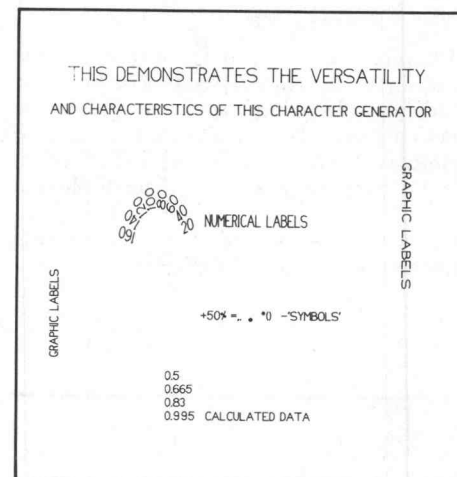
Program 7

Title: **Spider's Web Characters**

Author: Gene Lynch
Tektronix, Inc.
Wilsonville, OR
Memory Requirement: 16K
Peripherals: Optional-4662 Plotter
Statements: 402
Files: 1 ASCII Program

The subroutine draws characters for titles and illustrations. The curves of the characters are formed as an envelope of tangent line segments. Only standard upper case letters are supported. An example program is included to demonstrate program operation.
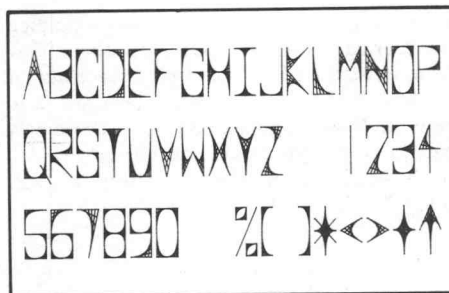
Program operation:

Store the characters to be drawn in P$
Store the width of a character in K0
Store the device address in K8 (32=screen)
Store the aspect ratio for a character in V3 (height/width)
Set a square window and viewport
Set the starting coordinates for the string to be drawn
Call the routine

Program 8

Title: **3-D Name Plot**
Author: Michael Poe, Bob Kopitzke
Tektronix, Inc.
Wilsonville, OR
Memory Requirement: 32K
Statements: 467
Files: 1 ASCII Program

This program will provide a three dimensional plot of a name consisting of any of the twenty-six letters of the English alphabet. Periods, commas and dashes may also be plotted. Names may be plotted in either block letters or as a series of small blocks.

Characters are scaled to fit across the screen; the more characters the smaller.
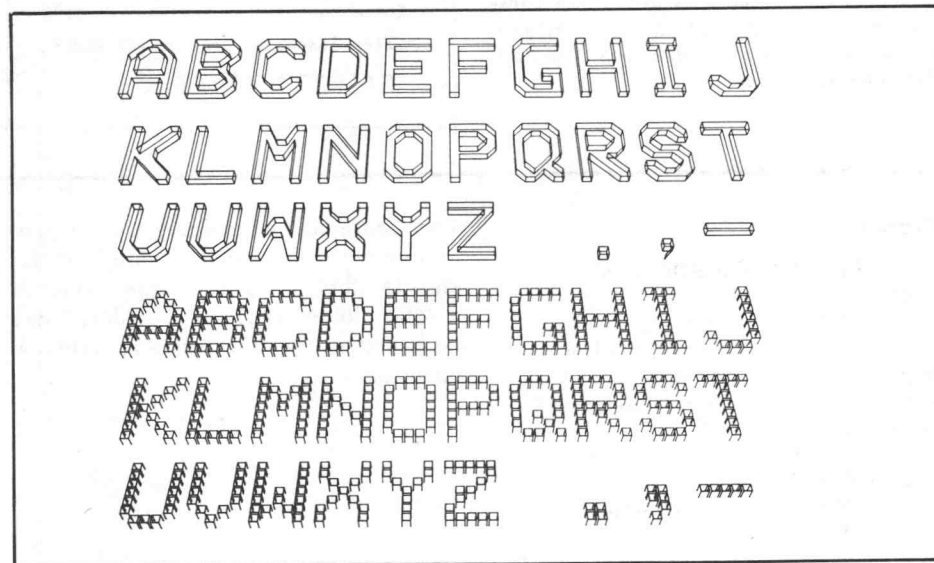
EDUCATION/RESEARCH T1
062-5982-01

Twelve educational and functional programs encompass a range of disciplines including chemistry, physics, statistics, electrical engineering, mathematics. The individual abstracts describe each program.

Title/
Previous Abstract #

Problem Solving in Physical Chemistry
51/00-5201/0

Computers, BASIC & Physics
51/00-5201/0

Graphics Demonstration for Astronomy and Physics
51/00-5401/1

Simulation of the Millikan Oil Drop Experiment
51/00-5408/0

Simulation of Binary Liquid-Vapor Boiling Point Diagrams
51/00-5203/0

SIDAP — Student Interactive Data Analysis Program
51/00-5507/0

Thevenin's Theorem
51/00-1407/0

Plane Triangle Solutions
51/00-5501/0

Circle Solutions
51/00-5502/0

Mixture Experiment & Contour
51/00-5505/0

Mass Properties
51/00-5406/0

Polarized Light
51/00-5405/0

Programs 1-2

Titles: **Problem Solving in Physical Chemistry**
by Roland R. Roskos
and **Computers, BASIC, and Physics**
by Herbert D. Peckham
Adapted by: Dr. P.C. Holman
University of Wisconsin
Stevens Point, WI
Memory Requirement: 8K
Statements: 1177 and 2185 respectively
Files: 48 ASCII Program

Two textbooks emphasize the use of computers for problem solving in sciences of chemistry and physics. Both employ BASIC as the language. Dr. Holman and students have modified programs from the books to run on the 4051. Programs can be used to solve common types of problems in these branches of the sciences. Save student time normally used keying in programs for use in studies.

12 programs from chemistry; 34 programs from physics. Only source code is provided. Documentation available in the source text books. Permission to include materials from these texts was graciously granted by the publisher of each.

Program 3

Title: **Graphics Demonstration for Astronomy and Physics**

Author: Dr. R.J. Reimann
Physics Department
Boise State University
Boise, ID

Memory Requirement: 8K
Peripherals: Optional-4662 Plotter
Statements: 903
Files: 12 ASCII Program

This is a program series, under the control of a directory, for the presentation of introductory astronomy and physics concepts to students with no computer experience. The series includes:

Ellipse—ellipses are drawn according to the user's choice of eccentricity. Kepler's first and second laws are illustrated.

Planetary Motion—the inner planets are initially aligned and then "race" in circular orbits according to Kepler's third law.

Binary Stars—circular orbits for binary systems are plotted using Kepler's third law. The user may select the masses and separation.

Stellar Magnitudes—relative apparent magnitudes (0-6) are drawn for stars under the assumption that brightness is proportional to area.

Phaser—a demonstration of the reference circle as related to simple harmonic motion.

Sidereal Time—a view of the Northern sky with sidereal clock is drawn according to the user's choice.

Solar Time—a view of the Northern sky is drawn according to the user's choice of date and time of day.

Satellite Orbit—earth satellite orbits are plotted using a 2-step iterative approximation of Newton's law of universal gravitation. User selects radial and tangential velocities with an optional choice of initial separation.

Trajectory—a 2-D trajectory is drawn using a 2-step iteration assuming drag is proportional to v^2. The plot is automatically scaled and labelled. The user selects velocity components Vx and Vy with an optional choice of drag coefficient.

Vector Combinations—addition of numerous 2-D vectors drawn head-to-tail. The plot is automatically scaled and the resultant is expressed in both rectangular and polar coordinates.

Linear Least-Squares Fit—user inputs number of data points and each x,y coordinate. The best fit to a straight line is calculated including standard errors. The plot is automatically scaled and "proper" "tic" marks are made on the axes. Hard copies are produced by pressing User Definable Key #3 if a TEKTRONIX 4662 Plotter is connected.
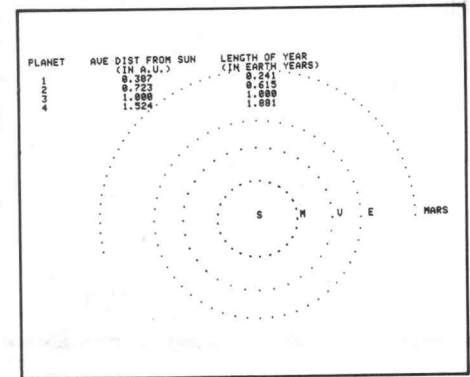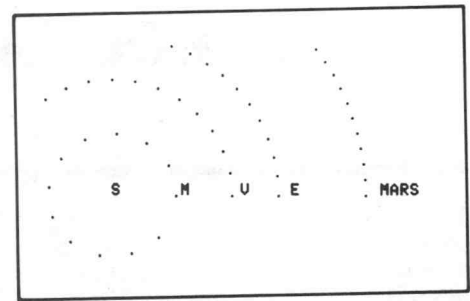
Program 4

Title: **Simulation of the Millikan Oil Drop Experiment**

Authors: D.D. Venable
R. Blakey
Hampton Institute
Hampton, VA

Memory Requirement: 16K
Statements: 384
Files: 1 ASCII Program
1 ASCII Text (Instructions)

The program simulates the Millikan Oil Drop experiment to determine the charge of the electron. The user inputs:

atmospheric pressure
viscosity of air
density of the oil

A view of the condenser plates and reticule lines, as seen through a telescope, is then displayed on the screen. Condenser plate separation and reticule line spacing are programmed by the instructor and appropriate values are displayed on the screen. A blinking "o", used to represent the oil-drop, is made to move vertically upward in the field of view representing an oil drop falling at terminal velocity in air with no electric field applied. The radius of the oil drop and the number of unit charges it carries are randomly selected on a range that has been determined to be appropriate for the laboratory experimental conditions.

The User-Definable Keys are used to:

vary the condenser voltage from 0 to 500 V in steps of 100 V
select the polarity of the plates (+ or −)
charge the drop
change input parameters (atmospheric pressure, viscosity of air, oil density)
reset drop position
select new drop (with new radius and new charge)
display voltage
stop

The step size with which the cursor moves vertically on the screen is software controlled and has been carefully calibrated, so that the velocities of the oil drop measured directly from the screen will be equal to the velocities of that drop in air for the same experimental conditions. If the oil drop is allowed to make contact with either condenser plate, it will be lost, and a new drop would have to be selected.
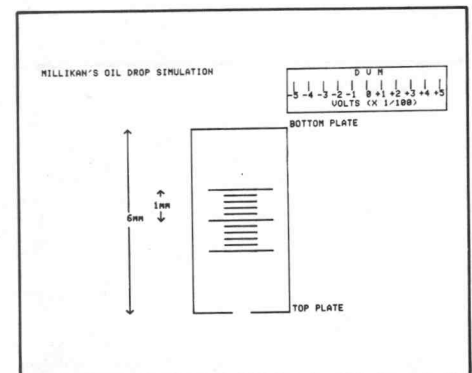
Program 5

Title: **Simulation of Binary Liquid-Vapor Boiling Point Diagrams**

Author: Gilbert F. Pollnow, Ph.D.
Dept. of Chemistry
University of Wisconsin
Oshkosh, WI
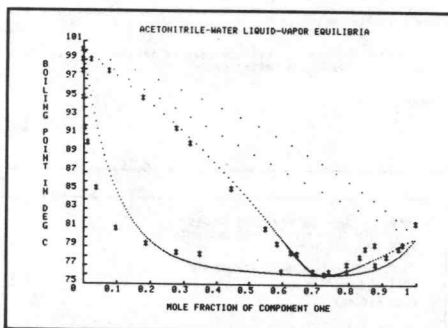
Memory Requirement: 16K
Statements: 272
Files: 1 ASCII Program

The program computes both the ideal and Van Laar approximations to the liquid and vapor compositions for any binary pair for which the Antoine or Clausius-Clapeyron vapor pressure equation constants are available along with the azeotropic mole fraction of either component, barometric pressure, and boiling point of the azeotrope.

Experimental liquid-vapor composition data as a function of temperature will also be plotted, if loaded into the appropriate DATA segments within the program.

A complete data set for the system acetonitrile-water is included within the program by way of illustration. Tabular as well as graphical output is optional at your discretion.

The program includes an example and is tutorial.

ACETONITRILE-WATER LIQUID-VAPOR EQUILIBRIA

Program 6

Title: **SIDAP—Student Interactive Data Analysis Program**

Author: Dr. D.J. Steck
T. Huber
Dept. of Physics
St. John's University
Collegeville, MN

Memory Requirement: 32K
Perihperals: Optional—4641 Printer
4662 Plotter
Statements: 980
Files: 1 ASCII Program

The program helps the user find the "best" functional relationship for a two-dimensional data set that includes experimental uncertainties. The program operates at either a normal or an advanced level. The normal level has seven "standard", two-parameter functions available to fit the data.

1. Linear Y=A+BX
2. Power Y=A X↑B
3. Exponential Y=A EXP (BX)
4. Con-expo Y=A (1–EXP(–BX))
5. Nat Log Y=A+B LN(X)
6. Inverse Y=A+B/X
7. Hyperbolic Y=X/(A+BX)

Extensive tutorial messages and plots help the user enter data and judge the fit. At the advanced level the program is more versatile and less tutorial. It allows for additional functional forms having up to 5 parameters.

User input:

Experiment Title
Name (user's)

Number of data points to be used (up to 40)
Data points (in the form X,Y)

Once an acceptable fit is achieved, the experiment data and table of calculated values may be output to the 4050 screen or a 4641 Printer. A graph of the data and fit may be output to the 4050 screen or the 4662 Plotter. Output to the plotter allows the user to label the X and Y axes, set the graph scale, change pen colors for the axis, data and fit.

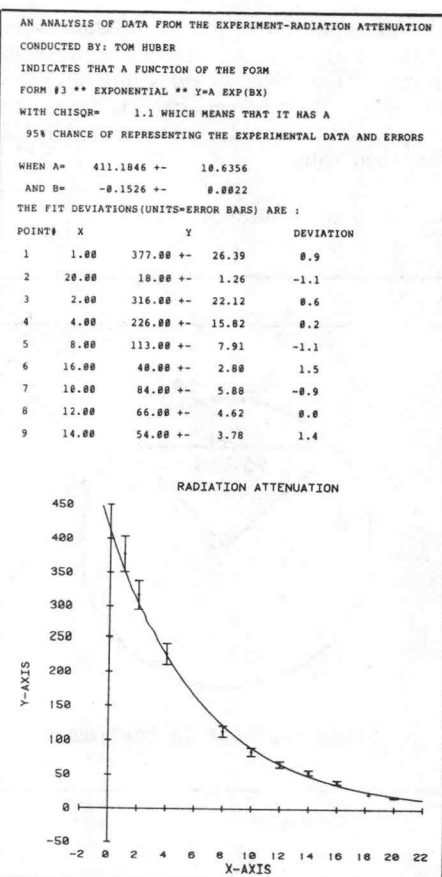Data may be stored on tape in a pre-MARked data file.

```
AN ANALYSIS OF DATA FROM THE EXPERIMENT-RADIATION ATTENUATION
CONDUCTED BY: TOM HUBER
INDICATES THAT A FUNCTION OF THE FORM
FORM #3 ** EXPONENTIAL ** Y=A EXP(BX)
WITH CHISQR=    1.1 WHICH MEANS THAT IT HAS A
95% CHANCE OF REPRESENTING THE EXPERIMENTAL DATA AND ERRORS

WHEN A=    411.1846 +-      10.6356
 AND B=     -0.1526 +-       0.0022
THE FIT DEVIATIONS(UNITS=ERROR BARS) ARE :
POINT#   X            Y                  DEVIATION
1     1.00      377.00 +-    26.39         0.9
2    20.00       18.00 +-     1.26        -1.1
3     2.00      316.00 +-    22.12         0.6
4     4.00      226.00 +-    15.82         0.2
5     8.00      113.00 +-     7.91        -1.1
6    16.00       40.00 +-     2.80         1.5
7    10.00       84.00 +-     5.88        -0.9
8    12.00       66.00 +-     4.62         0.0
9    14.00       54.00 +-     3.78         1.4
```


RADIATION ATTENUATION

TABLE OF CALCULATED VALUES	
Y-CALCULATED	CURRENT X VALUE
411.184577528	0
352.997057334	1
303.043765006	2
260.159459126	3
223.343793829	4
191.737984118	5
164.60477331	6
141.311235336	7
121.31401071	8
104.146631791	9
89.4086416726	10
76.7562528741	11
65.8943279425	12
56.5694948934	13
48.5642368989	14
41.6918183558	15
35.791928975	16
30.7269442848	17
26.3787153171	18
22.6458125915	19
19.4411601082	20

Program 7

Title: Thevenin's Theorem

Author: John G. Lingle
        Tektronix, Inc.
        Beaverton, OR
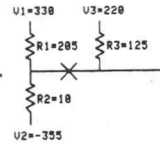
Memory Requirement: 16K

Statements: 378

Files: 1 ASCII Program

The program provides computer aided instruction on how to THEVENIZE. The user inputs the number of voltage sources; the program randomly selects values for the voltages and resistors. The following may be selected to solve the problem:

1. The program will progress through the solution, detailing each step.

2. The user may solve the problem. The user has the option of using the 4050 as a calculator to assist in computing the answer. Two attempts are allowed to input the correct answer. If the correct answer is not input the user may select to view the solution using the above process.


```
WOULD YOU LIKE TO SEE A THEVENIN

PROBLEM SOLVED (Y OR N)?Y

ENTER NUMBER OF SUPPLIES  3

THEVENIN'S is a method of solving circuits with
TWO or more power supplies.


Using THEVENIN'S requires that only TWO supplies
be considered at a time.


Each complete step reduces the number of supplies
and resistive branches by one.


Eventually the circuit will be reduced to one
equivalent supply and resistor.

PUSH RETURN:
```

```
ASSUME THE CIRCUIT IS OPEN WHERE
THE "X" IS AND ONLY CONSIDER THE
PORTION TO THE LEFT OF THE "X".

TREAT THE CIRCUIT AS A SERIES BRANCH
AND CALCULATE THE VOLTAGE AT THE
POINT WHERE THE CIRCUIT WAS OPENED.

PUSH RETURN:

THE VOLTAGE IS -323.2 AND IS CALLED "Voc"
(open circuit VOLTAGE).

NOW COMPUTE THE PARALLEL RESISTANCE
OF THE TWO RESISTOR BRANCHES.

PUSH RETURN:

THE EQUIVALENT RESISTOR IS 9.5 AND IS CALLED Rth (Resistance Thevenin).

TO COMPLETE THIS STEP REPLACE THE TWO RESISTOR BRANCHES
WITH THE PARALLEL EQUIVALENT AND USE THE CALCULATED Voc
FOR THE VOLTAGE SUPPLY.

PUSH RETURN:
```

```
THERE IS JUST ONE RESISTOR BRANCH
AND POWER SUPPLY LEFT THAT HAS NOT
BEEN INCLUDED YET.

CALCULATE THE VOLTAGE BETWEEN THE
LAST TWO RESISTORS.

PUSH RETURN:

THE VOLTAGE -284.7 AT THIS JUNCTION IS
THE ACTUAL VOLTAGE.

WHAT IS THE PARALLEL EQUIVALENT OF
THESE TWO RESISTORS.

PUSH RETURN:

THIS IS THE FINAL Rth AND IS 8.8

NOW THAT YOU KNOW HOW TO SOLVE THIS PROBLEM,
HOW WOULD YOU LIKE TO TRY ANOTHER ONE?
```

Program 8

Title: Plane Triangle Solutions

Author: Dan Taylor
        Tektronix, Inc.
        Wilsonville, OR

Memory Requirement: 16K

Statements: 278

Files: 1 ASCII Program

Plane Triangle Solutions is an interactive program which graphically demonstrates the relationship between sides and angles of a triangle.

The user enters any three of the three sides and three angles of a triangle. The program solves for the unknown sides and/or angles and prints their values. It then draws the triangle with the sides and angles labeled with their values.

The program is tutorial.
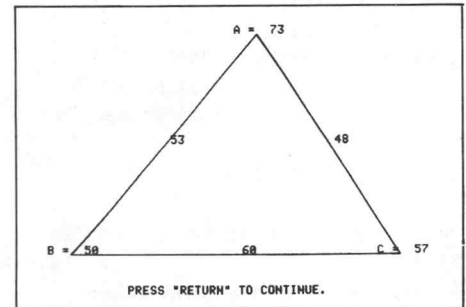
Program 9

Title: Circle Solutions

Author: Dan Taylor
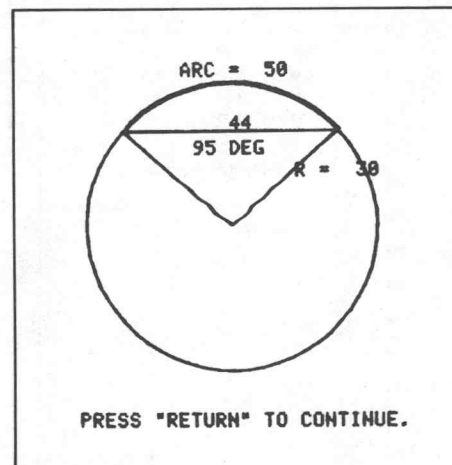   Tektronix, Inc.
        Wilsonville, OR

Memory Requirement: 8K

Statements: 154

Files: 1 ASCII Program

Circle Solutions is an interactive program which graphically demonstrates the relationship between a sector and its circle.

The user enters any two of the angle, radius, chord, or arc of a sector. The program solves for the unknowns and prints their values. It then draws the circle and the sector and labels the portions of the sector.

The program is tutorial.

Program 10

Title: **Mixture Experiment & Contour**

Author: Connie Breithaupt
Tektronix, Inc.
Rockville, MD

Memory Requirement: 32K

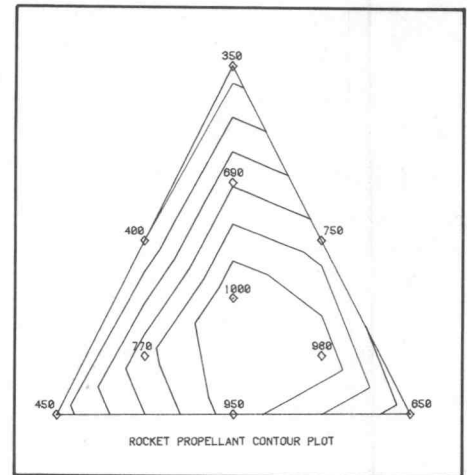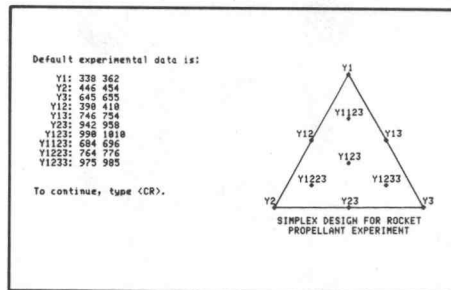Peripherals: Optional-4662 Plotter
4641 Printer

Statements: 956

Files: 1 ASCII Program
(includes experimental data)

This program was developed for a specific application: an acceptable rocket propellant using mixtures of three components. However, the evaluation method could be of use in other fields.

The mixture problem was evaluated using the "Simplex" design. The response was evaluated statistically and plotted.

The 10-Run Simplex design determined the elasticity of rocket propellant for any mixture of the three components. The response surface contours were displayed to indicate the best values of the response. Elasticity data from the runs were input for the 10 locations. Data input incorrectly could be changed.

A complete documentation of Simplex design, formulae and method are included.

ROCKET PROPELLANT CONTOUR PLOT


```
Default experimental data is:

   Y1:  338 362
   Y2:  446 454
   Y3:  645 655
   Y12: 390 410
   Y13: 746 754
   Y23: 942 958
   Y123: 990 1010
   Y1123: 684 696
   Y1223: 764 776
   Y1233: 975 985

To continue, type <CR>.
```

SIMPLEX DESIGN FOR ROCKET
PROPELLANT EXPERIMENT

Program 11

Title: **Mass Properties**

Author: P.C. Holman
University of Wisconsin
Stevens Point, WI

Memory Requirement: 16K

Peripherals: None

Statements: 455

Files: 4 ASCII Program

The program consists of four programs in separate files.

1. Mass properties of a right circular cylinder.

This program computes the following mass properties for a right circular cylinder:

a. Volume in cubic inches
b. Weight in pounds
c. Z centroid in inches
d. Ix, Iy, Iz, Ixl, and Iyl weight moments of inertia in pounds per square inch
e. Px, Py, and Pz radii of gyration in inches

2. Mass properties of a cube.

This program computes the following mass properties for a cube:

a. Volume in cubic inches
b. Weight in pounds
c. X, Y, and Z centroids in inches
d. Ix, Iy, Iz, Ixl, Iyl, and Izl weight moments of inertia in pounds per square inch
e. Pz1 and Px2 radii radii of gyration in inches

3. Mass properties of a hollow right cylinder—weight known.

This program computes the following mass properties for a hollow right cylinder where the weight is known:

a. Ix, Iy, and Iz weight moments of inertia in pounds per square inch
b. Px, Py and Pz radii of gyration in inches

4. Mass properties of a regular triangular prism.

This program computes the following mass properties for a regular triangular prism:

a. Volume in cubic inches
b. Weight in pounds
c. X, Y, and Z centroids in inches
d. Ix, Iy, and Iz weight moments of inertia in pounds per square inch
e. Px, Py, Pz radii of gyration in inches
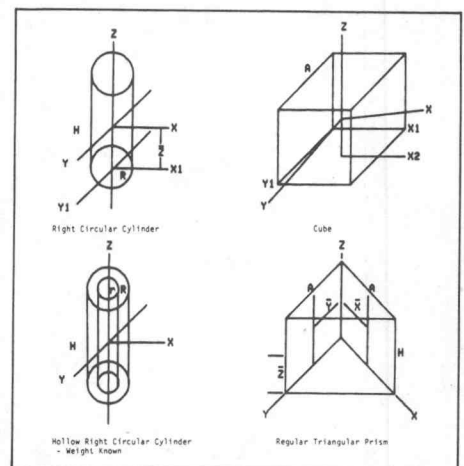
Program 12

Title: **Polarized Light**

Author: Pilwon Kang
Hood College
Frederick, MD

Memory Requirement: 8K

Statements: 386

Files: 3 ASCII Program

The program performs some of the fundamental calculations frequently encountered in the analysis of polarized light. The program is written in three parts (in three files), to fit into 8K of memory.
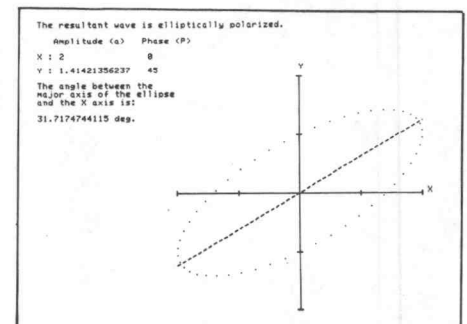
FILE 1. Plots the vibration pattern of light when you specify the nature of polarization (Jones vector or trigonometric form).

FILE 2. Calculates the parameters of the resultant light if polarized light is passed through a specified optical element. You supply the matrices of the optical device and the incident light.

FILE 3. Obtains the following:

1. The values of the reflection coefficient and reflectance.
2. The Jones matrix of the reflected light.

3. A plot of the reflectance as a function of the angle of incidence.


```
The resultant wave is elliptically polarized.
        Amplitude (a)   Phase (P)
X : 2               0
Y : 1.41421356237   45
The angle between the
major axis of the ellipse
and the X axis is:
31.7174744115 deg.
```

EDUCATION/RESEARCH T2
062-5983-01

Data acquisition and statistical analyses are integral parts of research and education. Sixteen programs provide methods and algorithms to aid such endeavors. The individual abstracts describe each program.

Five of the programs must be transferred to their own dedicated tapes. The documentation contains complete instructions for accomplishing the transfers.

Title/
Previous Abstract

3D Function Plot
51/00-5506/0

Digitize and Modify Data
51/00-8033/0

Kaplan-Meier Survival Table Compu-Plotter
51/00-5701/0

NMR Calculation for a Three Spin System
51/00-5202/0

Optical Ray-Trace
51/00-5404/0

CHROMPLOT
51/00-5204/0

Measurement of Absorption Spectra
51/00-5407/0

Cobalt-60 Calibration Chart
51/00-4001/0

Blood Pressure Evaluation and Patient Data With Statistical Analysis
51/00-4002/0

Timer Calculation For Cobalt-60 Treatment Plans
51/00-4003/0

One Factor Repeated Measures Analysis of Variance
51/00-5703/0

Two Factor Repeated Measures of Independent ANOVA
51/00-5702/0

Scheffe' Multiple Comparison Procedure
51/00-5721/0

Cubic Spline Interpolation
51/00-5504/0

On-Line Spectral Analysis (OLSA)
51/00-5205/0

On-Line Calorimetry Data Acquisition and Analysis (DCAL)
51/00-5206/0

Program 1

Title: **3D Function Plot**
Author: Dony Robert
Brussels, Belgium
Memory Requirement: 8K
Peripherals: Optional 4662 Plotter
Statements: 206
Files: 1 ASCII Program

This program draws a 3D plot of a two-variable mathematical function $(Z=F(X,Y))$, with the hidden lines removed from the plot. The user defines the function and enters real or representative data to obtain the plot. However, the program does not prompt for these inputs; the user simply enters them into the specified lines in the program.

The program provides the option of obtaining uniform scaling so that the plot surface fills the entire screen, which doesn't provide an accurate representation of the function, or obtaining true (rather than uniform) scaling. This option is set by changing a single program line.

The user may also set the following:
    interval on the X and Y axis
    azimuth angle in degrees
    dip angle in degrees
    number of lines on the surface
    number of points on each line
    file number to record the data on tape for later use or faster drawing


```
120 DATA -10,10,-10,10,45,30,51,51,0
2000 Z=10*SIN(X)/X*SIN(Y)/Y
```
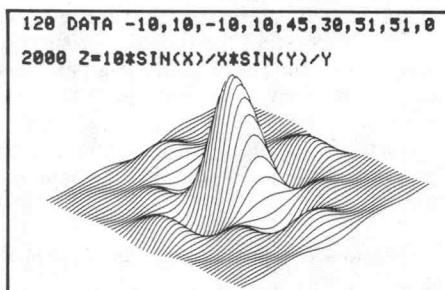
Program 2

Title: **Digitize and Modify Data**

Author: Barry T. Bates
               Dept. of Physical Education
               University of Oregon
               Eugene, OR

Memory Requirement: 16K

Peripherals: Digitizer using GPIB

Statements: 505

Files: 1 ASCII Program
        Data Files Required

The program inputs data from a digitizer and writes it to tape. Data may be stored in two forms: A) Two files per data point digitized, first file: I\$,N,T1,X1,T2,X2, . . .; second file: I\$,N,T1,Y1,T2,Y2; or B) Single file: I\$,N,P,X1,Y1,X2,Y2 . . Xn,Yn,T1,T2, . . . TN; where T values are absolute time of occurrence or image number input as integer values and X and Y are the coordinates of the data points. Choice A is convenient if data is to be smoothed.

The user indicates the number of data points to be digitized per frame/image and the total number of frames/images is determined by memory. The data for each frame/image may be digitized once or several times and averaged for storage. In addition the user can input a reference point as the last data point and all values can be shifted so they are identified relative to this point. This references all frames/images to a common coordinate system without reorientation of the coordinate system with each new frame/image. Program is terminated by a time or counter value greater than 99. The data may be corrected during or following digitizing. User-Definable Keys scale, shift, print and graph the data.

Parts of the program may be overlaid to increase memory for data.

```
MANIPULATION OF DATA IN COMPUTER

DATA FROM DIGITIZER        = KEY 2
STORE DATA ON TAPE         = KEY 3
CORRECTION OF DATA POINTS  = KEY 4
SHIFT ALL THE DATA POINTS  = KEY 5
SCALE ALL THE DATA POINTS  = KEY 6
ADJUST FOR REFERENCE POINT = KEY 7
PRINT OR GRAPH THE DATA    = KEY 8
DATA FROM A TAPE FILE      = KEY 9
TO END THIS PROGRAM        = KEY 10
SOURCE OF PROGRAM TAPE: 4051(33) OR 4924(1) 33


This program occupies much of the unit's memory. If you will
be manipulating a large data base you may elect to swap
parts of the program in and out of memory to leave extra
space for data. However you may trade off memory for time.
Do you want to maximize memory (Y or N): N


Press the appropriate key when ready


If you run into problems in the middle of the program press
the break key twice then press key 1 for menue.
```

```
CHOOSE WHICH COMBINATION IS REQUIRED

NO OPTIONS ARE AVAILABLE OUTSIDE YOUR SELECTION

1    DIGITIZE then TO TAPE
2    FROM TAPE then CORRECT then TO TAPE
3    FROM TAPE then SHIFT then TO TAPE
4    FROM TAPE then SCALE then TO TAPE
5    FROM TAPE then ADJUST FOR REF PT then TO TAPE
6    FROM TAPE then PRINT/GRAPH

Which number is your choice:
```

```
1 = MAKE TEXT FROM KEYBOARD OR GET TEXT FROM FILE
2 = LIST LINES OF TEXT
3 = DELETE LINES OF TEXT
4 = INSERT LINES
5 = SWAP LINES
6 = SEARCH AND REPLACE CHARACTERS
7 = RENUMBER LINES
8 = SAVE ON TAPE
9 = QUIT

WHICH ACTION?
```

Program 3

Title: **Kaplan-Meier Survival Table Compu-Plotter**

Author: Paul W. Baim
               Division of Biostatistics
               University of Miami
               School of Medicine
               Miami, FL

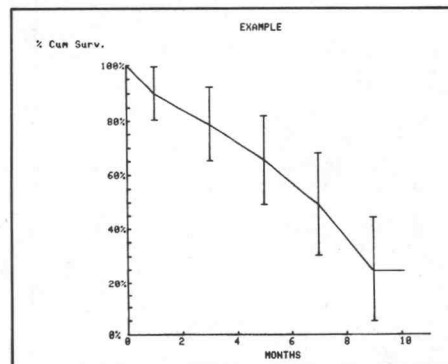Memory Requirement: 24K

Statements: 348

Files: 1 ASCII Program

The survival table is a means of measuring the response or nonresponse of subjects over time. This response may mean improvement of patients receiving a new drug, or failure of light bulbs using a new type of filament; both lend themselves equally well to this type of study.

The program accepts raw data from the keyboard in the form of dates and subject status (minimum of 2 cases, maximum of 85, with 24k). The dates correspond to the beginning and end of the interval during which a particular subject is under study. The subject status indicates whether the subject is still responding at the end of the interval, or has stopped responding; for instance, whether a battery is still producing current after six days time, or has gone dead. The program then converts the raw data into a table of three columns: the interval, the cumulative survival, and the standard error. The interval is the same as that mentioned earlier, the cumulative survival represents the percentage of subjects surviving (i.e. responding) for this particular interval or longer, and the standard error establishes the reliability of the cumulative survival figure. Next, the program will, on demand, graph the calculated values, with the time intervals on the X axis and the cumulative survival percentages on the Y axis. The standard errors are shown by vertical lines. The purpose of the graph is to show clearly, how subjects are responding. Finally, the program will, on demand, list the data as it was entered.

Limitations: No provision to correct or store data.

Program 4

Title: NMR Calculation for a Three Spin System

Authors: Tom Price, Dr. Jack Reid
Lorillard Div. of Loews
Greensboro, NC

Memory Requirement: 16K
Peripherals: Optional-4641 Printer
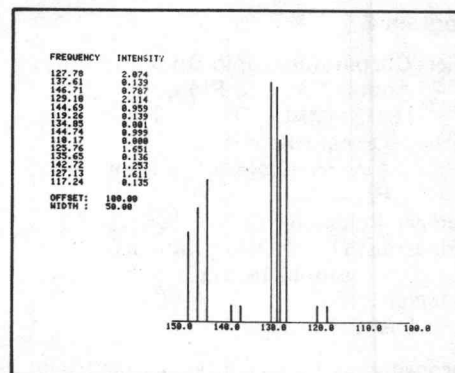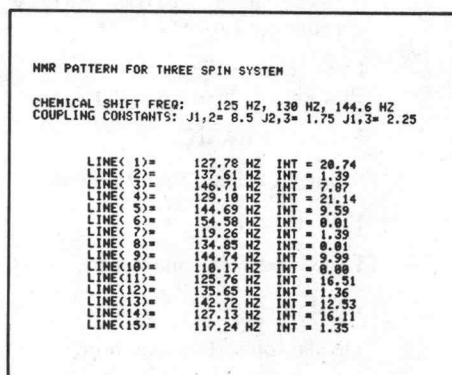Statements: 267
Files: 1 ASCII Program

This program calculates the spin-spin transition frequencies and relative intensities for a three spin Nuclear Magnetic Resonance (NMR) system. The energies of the eight possible energy states are calculated using the chemical shifts, in Hz, and coupling constants in Hz, entered from the keyboard.

In the three spin system there are four possible energy levels. The first and fourth each contain one spin state; however, the second and third each contain three spin states. The energies of these states are used as the diagonals of two 3 x 3 matrices. The off diagonal elements are calculated from the respective coupling constants. The two matrices are diagonalized, by the method of Jacobi[1][2] and the intensities calculated by identical diagonalization operations on an identity matrix. The final transition frequencies are calculated by the difference in the energies between adjacent energy levels.

The output is displayed as either a listing and an NMR line spectrum on the graphic terminal or a listing on the printer.

```
NMR PATTERN FOR THREE SPIN SYSTEM

CHEMICAL SHIFT FREQ:    125 HZ, 130 HZ, 144.6 HZ
COUPLING CONSTANTS: J1,2= 8.5 J2,3= 1.75 J1,3= 2.25


        LINE( 1)=      127.78 HZ   INT = 20.74
        LINE( 2)=      137.61 HZ   INT = 1.39
        LINE( 3)=      146.71 HZ   INT = 7.87
        LINE( 4)=      129.10 HZ   INT = 21.14
        LINE( 5)=      144.69 HZ   INT = 9.59
        LINE( 6)=      154.58 HZ   INT = 0.01
        LINE( 7)=      119.26 HZ   INT = 1.39
        LINE( 8)=      134.85 HZ   INT = 0.01
        LINE( 9)=      144.74 HZ   INT = 9.99
        LINE(10)=      110.17 HZ   INT = 0.00
        LINE(11)=      125.76 HZ   INT = 16.51
        LINE(12)=      135.65 HZ   INT = 1.36
        LINE(13)=      142.72 HZ   INT = 12.53
        LINE(14)=      127.13 HZ   INT = 16.11
        LINE(15)=      117.24 HZ   INT = 1.35
```

```
FREQUENCY   INTENSITY
127.78       2.074
137.61       0.139
146.71       0.787
129.10       2.114
144.69       0.959
119.26       0.139
134.85       0.001
144.74       0.999
110.17       0.000
125.76       1.651
135.65       0.136
142.72       1.253
127.13       1.611
117.24       0.135

OFFSET:   100.00
WIDTH :    50.00
```

Program 5

Title: Optical Ray-Trace

Author: James L. Hutchinson
Dept. of Physics/Astronomy
Vassar College
Poughkeepsie, NY

Memory Requirement: 32K
Peripherals: 4662 Plotter
Statements: 555
Files: 1 ASCII Program

The program consists of two parts. The first part calculates the actual three-dimensional paths of light rays through a user-specified system of spherical or planar surfaces, lenses, mirrors or stops. A plot of the system is made in plane and elevation to show the paths of the rays along the Z-axis. Light rays proceed through the system normally from left to right and can be plotted in contrasting colors. The rays are followed until they intersect the image surface or a stop, or until they fail to intercept a subsequent optical surface. Distance units are arbitrary; the program plots the system to scale. A plot of the intersection of the rays with the chosen image surface is also given.

The rays traced through the system can be chosen manually or automatically. In the manual mode, you must separately specify the orientation of each incoming ray. In the automatic mode, rays are chosen from a standard set of 21 rays distributed over four zones of the first optical surface. The end results of the calculations can be saved internally in the program or on tape (manual mode only) to allow further investigation of the structure of the image.

In the second part of the program, you can select different locations of the image surface to see how the presence of aberrations affect the quality of focus of the image.

```
VASSAR COLLEGE OPTICAL RAY-TRACE PROGRAM




        X vs Z




        Y vs Z                   IMAGE SURFACE (X vs Y)
```
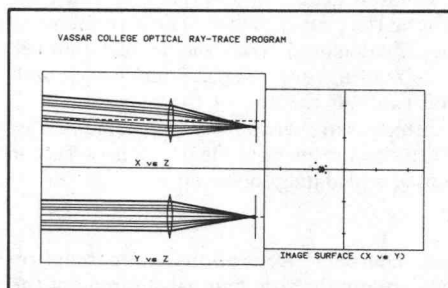
Program 6

Title: **Chromatographic Data Acquisition and Plotting (CHROMPLOT)**

Author: Leonard H. Ponder
American ENKA Company
Enka, NC

Memory Requirement: 24K/16K

Peripherals: Opt. 1 Data Communications Interface

Statements: 528

Files: 1 ASCII Program

Chromatographic data from an electronic integrator (or digitizer) is recorded on magnetic tape and subsequently plotted on the basis of the original time axis, relative time axis, or molecular size axis. Relative retentions and molecular sizes are calculated automatically. The program is useful in liquid chromatography, gel permeation chromatography, and gas chromatography, or with similar data.

Each chromatogram or selection portion of the chromatogram is scaled to fit the allotted plotting area.

The program is easy to use. Pressing a User-Definable Key activates the desired routine; the routines are shown below. Documentation includes a variable table, flowcharts and detailed instructions.

UDK	Function
1	Minimum and maximum for entire chromatogram
2	Scale and plot entire chromatogram
3	Data to tape
4	Plot entire chromatogram
5	Return to BASIC
6	Change ordinate and abscissa
7	Plot selector
8	Label under chromatogram
9	Read tape
10	Display-only (terminal mode)
11	Minimum and maximum, specific interval
12	Not used
13	Data to tape (no instructions)
14	Molecular size label
15	Display molecular size
16	Print times and min-max
17	Continue over-plot
18	Label above chromatogram
19&20	Not used

POLYSTYRENE STANDARDS
Run Nos. 5,9,10

Time: 8.00 to 25.00.   X-Axis: 0.35 to 1.11 , Relative

Typical Output Using Plot Selector Routine for Time Axis: 3 chromatograms, each for on-scale peaks except right-most peak (reference peak) to be off-scale.
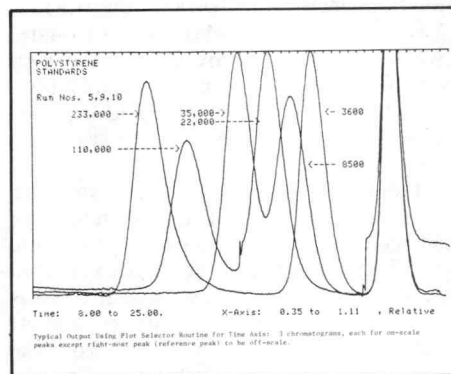
Program 7

Title: **Measurement of Absorption Spectra**

Author: John Rolfe
National Research Council
Ottawa, Canada

Memory Requirement: 16K

Peripherals: 4907 File Manager
GPIB Digital Voltmeter
Hewlett Packard 6940B Multiprogrammer
300 Baud Printer
Optical Apparatus
Option 1 Data Communications Interface

Statements: 349

Files: 1 ASCII Program
Requires Data Files

The apparatus controlled by this program measures optical transmittance of a sample as a function of wavelength. Wavelength is varied by a stepping motor on a monochromator. An analog circuit with a voltage output of 0 to +10 volts monitors the transmittance.

The program controls the stepping motor through an HP 6940B with a 59500A GPIB Interface unit. The digital voltmeter used to read transmittance is a Systron-Donner 7344A. Program slews stepping motor to starting wavelength, scans through to ending wavelength in steps separated by time intervals. Step size and time intervals are calculated by the program for optimum information collection based on the monochromator band width (calculated from the slit width) and the time constant of the analog circuit.

The data is printed in tabular form, plotted on the 4050 screen and recorded on the 4907 disc as the run progresses. The main data file is random access binary, each record containing the transmittance. The wavelength is easily calculated from the record number since readings are taken at equal wavelength intervals. At the end of the experiment all parameters are written on a separate header file, a short sequential file which is useful for subsequent data processing.

User-Definable Keys allow for interruption or stopping the run, manual stepping of the monochromator, and some housekeeping functions.
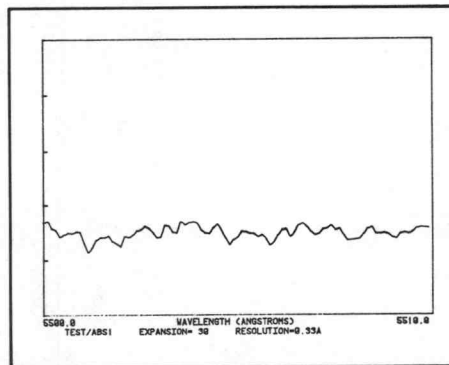
b) Printer output

USERLIB=TEST   FILE=ABS1   TIME OF EXPERIMENT: 04-FEB-80 15:42:43
NOTES: TEST RUN, 100% TRANSMISSION
SCALE EXPANSION=30   SLIT WIDTH=30 MICRONS   TEMPERATURE=300.0 K

REC.NO.	WAVELENGTH	TRANSMITTANCE (STEPS OF 0.104 ANGSTROMS)
1	5500.0	5.38 5.39 5.39 5.30 5.23 5.27 5.38 5.39 5.43 5.38
11	5501.0	5.66 5.68 5.64 5.61 5.60 5.56 5.54 5.63 5.74 5.76
21	5502.1	5.79 5.84 5.88 5.85 5.78 5.69 5.61 5.50 5.40 5.28
31	5503.1	5.08 5.14 5.10 5.09 5.09 5.04 4.94 4.91 4.96 4.95
41	5504.2	4.73 4.85 4.92 4.93 4.88 4.81 4.80 4.79 4.78 4.73
51	5505.2	5.01 4.96 4.92 4.94 4.92 4.99 4.98 4.97 4.96
61	5506.2	5.11 5.12 5.17 5.18 5.12 5.14 5.17 5.08 5.04 5.02
71	5507.3	5.08 5.15 5.22 5.21 5.17 5.26 5.32 5.33 5.28 5.23
81	5508.3	5.24 5.27 5.29 5.20 5.19 5.21 5.24 5.21 5.21 5.22
91	5509.4	5.37 5.35 5.30 5.20 5.21 5.21 5.25 5.20 5.12 5.09
101	5510.4	5.39 5.44 5.48 5.52 5.51 5.51 5.48 5.42 5.35 5.29
111	5511.5	5.36 5.38 5.40 5.41 5.39 5.45 5.45 5.46 5.54 5.60
121	5512.5	5.84 5.88 5.96 5.99 6.00 6.09 6.09 6.03 5.92 5.80
131	5513.5	5.52 5.59 5.58 5.53 5.50 5.53 5.61 5.68 5.69 5.70
141	5514.6	5.45 5.52 5.55 5.49

TIME CONSTANT=1SEC.   RESOLUTION=0.33 ANGSTROMS
STARTING WAVELENGTH: 5500.0   ENDING WAVELENGTH: 5515.0 ANGSTROMS
YMIN=4.731   YMAX=6.090
ADDITIONAL NOTES: *NONE
04-FEB-80 15:45:31

Program 8

Title: **Cobalt-60 Calibration Chart**

Author: C.S. Narayanan
        Lutheran Hospital
        Ft. Wayne, IN

Memory Requirement: 8K
Statements: 48
Files: 1 ASCII Program

The program calibrates treatment time for CO-60 Teletherapy units, which are used to treat cancer patients. The CO-60 radioactive source decays (loses its strength) according to its half life. The output of the therapy unit must be calibrated and changed accordingly. This program will give you the output calibration. Enter the present output for various field sizes, and the calibrated output will be displayed. The display can be copied with the 4631 Hard Copy Unit.

```
AECL COBALT UNIT, LUTHERAN, HOSP., FT. WAYNE, IND.
CAL.PERIOD FROM          TRIMMERS EXTENDED
10-1-78   TO  12-1-78
         FIELD SIZE        OUTPUT
           4X 4            98.91
           5X 5            98.91
           6X 6            98.91
           7X 7            98.91
           8X 8            98.91
           9X 9            98.91
          10X10            98.91
          11X11            98.91
          12X12            98.91
          13X13            98.91
          14X14            98.91
          15X15            98.91
          16X16            98.91
          17X17            98.91
          18X18            98.91
          19X19            98.91
          20X20            98.91
          21X21            98.91
          22X22            98.91
          23X23            98.91
          24X24            98.91
          25X25            98.91
```

WARNING

The recipient of this program is solely responsible for checking the accuracy and appropriateness of this program and procedure.

Program 9

Title: **Blood Pressure Evaluation and Patient Data With Statistical Analysis**

Memory Requirement: 32K
Peripherals: Optional-4051R05 Binary
                Loader
Statements: 581
Files: 1 ASCII Program
      Requires Data Tape & PLOT 50
      Stat 4 Program

Although this program was custom designed for a particular hospital, it serves as a pattern for other medical users. The graphically-aided data entry for blood pressure readings and TcP02 readings is unique. It's user-oriented with all data entry initiated through User-Definable Keys.

The user keys in patient data:

    Name
    Record Number
    Age
    PVES #
    Sex
    Diabetic
    Smoker
    Standard Blood Pressure

Next a diagram of the lower torso guides blood pressure and TcP02 readings. These readings and the ratio of normal blood pressure to actual are displayed on the screen.

Then the patient's history is keyed in:

    Influencing Drugs
    Pertinent Laboratory Data

Operative Procedures
Outcome of Operative Procedures
Doppler Flow
Pre or Post

The program combines all of the data into one string and writes it to a patient data tape. Data for up to 240 patients may reside on one tape. A routine will select two data items from each patient file and write these items to another data tape in a format for use with Statistics Volume 4. In this case, the Linear Regression program analyzed sets of data.

The first file on the patient data tape contains the number of full data files on the tape, and an index into the files by patient record number.

Although no routines for data correction or special searching are provided, with the index already in place, it would be relatively simple to insert.

```
NAME: John Henry
PATIENT #: 12345
PVES #: 6789

B.P. RATIO TcP02
120  1.00  123
123  1.02  456
123  1.02  789
124  1.03  147
130  1.00  258
100  0.03  369
 99  0.02  909
```
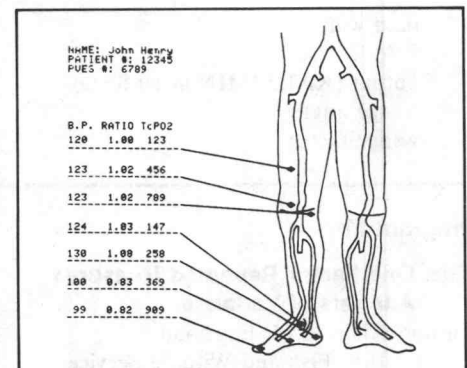
Program 10

Title: Timer Calculation For Cobalt-60 Treatment Plans

Author: David H. Robinson
St. Mary's Hospital
Waterbury, CT
Memory Requirements: 8K
Peripherals: 4662 Plotter
Statements: 154
Files: 1 ASCII Program

The program allows the user to specify the physical parameters necessary for implementing a completed treatment plan and performs the treatment time calculation for each beam. Data is entered via the keyboard and is then plotted on the treatment plan using the 4662 Plotter.

User Input:

Plan Description

number of beams
normalization number
total tumor dose

Individual Beam Parameters

field width
field length
output (RADS/MIN at 80 SSD)
wedge angle
wedge factor

wedge orientation
gantry angles
beam weight
tray factor

Isocenter Location

The program calculates the treatment time for each beam. All plan parameters are then plotted on the plan. Space is allocated for the user to place an anatomical drawing and indicate the level(s) at which the patient contour was taken.

WARNING

The recipient of this program is solely responsible for verifying the accuracy and appropriateness of this program for his treatment planning system.

```
ENTER THE NUMBER OF FIELDS IN THIS PLAN: 3
ENTER THE NORMALIZATION NUMBER (I.E. 140): 150
ENTER THE TOTAL TUMOR DOSE AT NORMALIZATION LEVEL (RADS): 200

BEAM # 1:
    FIELD WIDTH (CM): 8
    FIELD LENGTH (CM): 10
    EQUIVALENT SQUARE (CM): 8.9

    OUTPUT (RADS/MIN AT 80 SSD): 80.8

    WEDGE ANGLE (0=OPEN BEAM): 0
    WEDGE FACTOR (0=OPEN BEAM): 0
    WEDGE ORIENTATION (0=OPEN BEAM, 1=ANT, 2=POST, 3=LT,
        4=RT, 5=SUP, 6=INF): 0

    GANTRY ANGLE (START): 0
    GANTRY ANGLE (STOP): 0

    BEAM WEIGHT (I.E. 100): 100
    TRAY FACTOR (I.E. 0.98): 1.00

TREATMENT TIME: 1.65 MINUTES

CHANGE DATA FOR BEAM # 1 ?(Y/N):
```

```
TREATMENT TIME CALCULATION
-----------------------------
TOTAL DAILY TUMOR DOSE: 200 RADS      NORMALIZATION NUMBER: 150

                      WEDGE   WEDGE   ACTUAL                WEDGE   TRAY    OUTPUT      TREATMENT
BEAM #  WIDTH  LENGTH  EQSQ   ANGLE   ORIENT  GANTRY ANGLES  WEIGHT  FACTOR  FACTOR  (RADS/MIN)  TIME(MIN)
------  -----  ------  ----   -----   ------  -------------  ------  ------  ------  ----------  ---------
  1     8.0    10.0    8.9     0       0        0 -   0      100.0   1.00    1.00      80.8      1.65 min.
  2     8.0    10.0    8.9    30       1      240 - 240        50.0   0.70    1.00      80.8      1.18 min.
  3     8.0    10.0    8.9    30       1      120 - 120        50.0   0.70    1.00      80.8      1.18 min.

ISOCENTER LOCATION:                                    WEDGE ORIENT (THICK):
-----------------                                      ---------------------
SUPERIOR/INFERIOR: MOVE 1 CM SUPERIOR TO REFERENCE MARK   0=OPEN    1=ANT   2=POST
RIGHT/LEFT: ON MIDLINE REFERENCE MARK                              3=LT    4=RT
ANTERIOR/POSTERIOR: MOVE 1 CM ANT. TO REF. MARK -- ANT SSD=70.5 CM 5=SUP   6=INF
```

CONTOUR LEVEL(S)
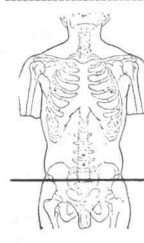
Program 11

Title: One Factor Repeated Measures Analysis of Variance

Author: Richard M. Engeman
U.S. Fish and Wildlife Service
Denver, CO
Memory Requirements: 16K
Peripherals: Optional—4641 Printer
Statements: 193
Files: 1 ASCII Program

The program calculates the univariate analysis of variance for data from a one factor repeated measures experimental design (see Winer, *Statistical Principles in Experimental Design*, pps 261-308).

Data is input from the keyboard and allows the user to make any necessary corrections. The program then outputs the following:

Analysis of variance table
Subject means
Means for treatment levels

All output, including the raw data, may be printed to the screen or to the 4641 Printer.

User Prompted Input:

Number of treatments
Number of subjects

Each subject's data
Output device (screen or printer)

```
THE DATA STRUCTURE AND NOTATION ARE AS FOLLOWS

                TREATMENT
    SUBJECT   1    2......K

      1       x11  x12....x1K
      2       x21  x22....x2K
      .        .    .       .
      N       xN1  xN2    xNK
```

```
THIS IS YOUR RAW DATA
30 28 16 34
14 18 10 22
24 20 18 30
38 34 20 44
26 28 14 30
DO YOU WANT THE DATA PRINTED ON ANOTHER DEVICE? Y OR N
```

```
                AOV TABLE

SOURCE            DF      SS        MS        F

WITHIN SUBJECT    4.    600.000
BETWEEN SUBJECT  15.    811.000
  TREATMENTS      3.    698.200   232.733   24.759
  RESIDUAL       12.    112.800     9.400
                ------------------------------
       TOTAL     19.   1491.000

PRESS G & RETURN AND THE SCREEN WILL PAGE
AND THE PROGRAM WILL CONTINUE
```

```
SUBJECT MEANS

SUBJECT 1       27
SUBJECT 2       16
SUBJECT 3       23
SUBJECT 4       34
SUBJECT 5       24.5

PRESS G & RETURN AND THE SCREEN WILL PAGE
AND THE MEANS FOR TREATMENT LEVELS WILL PRINT OUT
```

Program 12

Title: **Two Factor Repeated Measures and Independent ANOVA**

Author: Barry T. Bates
Dept. of Physical Education
University of Oregon
Eugene, OR

Memory Requirement: 16K
Peripherals: 4051R05 Binary ROM Pack
TransEra Auxiliary Memory
Manager
Statements: 744
Files: 1 ASCII Auto Load
8 Binary Program
Requires dedicated tape

This statistical package analyzes two factor repeated measure designs (AxBxS). Data may be input from the keyboard or from tape, and stored on tape. In addition to the summary table, the marginal means of each of the three matrices can be evaluated as well as any of the simple main effects. A final feature collapses the data into a two-factor independent measures design (AxB) or simply analyzes two-factor independent measures data. All main effects and simple main effects can be evaluated.

The program is separated into eight sections. Although the sections are stored in the Auxiliary Memory Module, they could be called from tape or disc. User-Definable Keys drive the program:

Data from keyboard
Data from tape
Data to tape
Compute
Matrix Computations
Summary Table (R)
Matrix Analysis (R)
Simple Main Effects (R)
Main Effects (I)
Summary Table (I)
Simple Main Effects (I)

```
3.  INTERNAL DATA STORAGE

a.

Simple Variables              Used to Store. . .

S                             Number of subjects
C                             Levels of one factor (conditions)
T                             Levels of other factor (trials)
N,K1                          Counters
N1                            S * T
C8,C9,R8,R9   }               Variables used to identify different degrees
S8,S9,T8,T9   }                  of freedom
F                             F-ratio and file number for tape
X1,X2,X3,X4   }               Variables used to calculate partial values for
Y1,Y2,Y3,Y4   }                  F-ratio
Z1,Z2,Z3,Z4   }
W1,W2                         Variables used to identify means for comparisons
P,Q,R                         Temporary variables for S,C,T
P$,Q$,R$                      Temporary variables for "S","C","T"
I$                            Title of tape file
G$,Z$                         Temporary string variables

Array Variables               Used to Store. . .

A(N1+1,C+1)                   Raw data plus row and column sums
A1(3)                         Sum of squares for C,S,T
A2(3)                         Sum of Squares for CS,CT,ST
A4(1)                         Sum of squared scores
B2(S)                         Sums of scores for S factors
B3(T)                         Sums of scores for T factors
A(1,C+1)                      Sums of scores for C factors
C1(C*S)                       Sums of scores for CS factors
C2(C*T)                       Sums of scores for CT factors
A(N1+1,I)                     Sums of scores for ST factors
S1(3)                         Sums of squared scores divided by number of scores
                                 for C,S,T
S2(3)                         Sum of squared scores divided by number of scores
                                 for CS,CT,ST
S3(1)                         Sum of squared scores divided by number of scores
                                 for CST
S4(1)                         Sum of squared scores
M(8)                          Mean squares
M1(S+1,C+1)                   Data plus row and column sums for SC matrix
M2(T+1,C+1)                   Data plus row and column sums for TC matrix
M3(S+1,T+1)                   Data plus row and column sums for ST matrix
M4(P+1,Q+1)                   Temporary array for simple main effects analysis
```

Program 13

Title: **Scheffe' Multiple Comparison Procedure**

Author: Glenn Galfond
Patuxent Wildlife Research
Laurel MD

Memory Requirement: 16K
Statements: 329
Files: 2 ASCII Program
Requires dedicated tape

This performs the Scheffe' multiple comparison procedure to separate linear model parameters in an analysis of variance (see Scheffe', *The Analysis of Variance*, pages 68—72).

File one allows the user to enter from the keyboard and conveniently edit the covariance matrix. The matrix is then stored on tape.

```
                       EXAMPLE

Intervals are in MONTHS.
 Interval     Cum. Surv.    # Ppl. rem.    Std. Error
 --------     ----------    -----------    ----------
    0          1.00            10
    1          0.9000           9            0.095
    3          0.7875           7            0.134
    5          0.6563           5            0.164
    7          0.4922           3            0.188
    9          0.2461           1            0.198
   10          0.2461           0
```

File two contains the multiple comparison procedure. The user enters the coefficient vector, the desired confidence level, and the file number on which the covariance matrix is stored. The analysis returns the half-length of the confidence interval.

Program 14

Title: **Cubic Spline Interpolation**

Authors: Monty McGraw
Jim Yadon

Memory Requirement: 8K
Statements: 135
Files: 2 ASCII Program
1 Binary Data (example)
Requires dedicated tape

This program will fit a smooth curve to up to 25 ordered X-Y data pairs (more if more memory) by generating piecewise cubic equations of the form:

$$Y_0 = A_3 X_0{}^3 + A_2 X_0{}^2 + A_1 X_0 + A_0$$

The cubic equations allow up to 290 interpolations of Y values and derivatives of the curve between data points. The program allows keyboard or tape entry of the data points and records the interpolated values on tape. The data file structure is compatible with the 4050 System Software X-Y Plot Program.

Limitations: No provision for data correction.
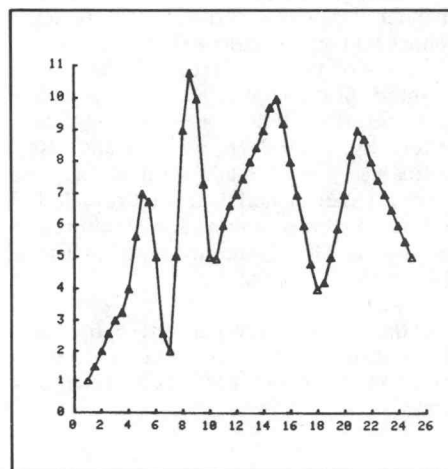

```
X(1)= 1         Y(1)= 1
X(2)= 1.5       Y(2)= 1.47795950612
X(3)= 2         Y(3)= 2
X(4)= 2.5       Y(4)= 2.56612148164
X(5)= 3         Y(5)= 3
X(6)= 3.5       Y(6)= 3.25755456731
X(7)= 4         Y(7)= 4
X(8)= 4.5       Y(8)= 5.65366024913
X(9)= 5         Y(9)= 7
X(10)= 5.5      Y(10)= 6.75280443614
X(11)= 6        Y(11)= 5
X(12)= 6.5      Y(12)= 2.58512200625
X(13)= 7        Y(13)= 1.99999999996
X(14)= 7.5      Y(14)= 5.83170753864
X(15)= 8        Y(15)= 8.99999999997
X(16)= 8.5      Y(16)= 10.788047839
X(17)= 9        Y(17)= 10.0000000001
X(18)= 9.5      Y(18)= 7.31610110548
X(19)= 10       Y(19)= 4.99999999996
X(20)= 10.5     Y(20)= 4.94754773904
X(21)= 11       Y(21)= 5.99999999997
X(22)= 11.5     Y(22)= 6.64370793801
X(23)= 12       Y(23)= 6.99999999996
X(24)= 12.5     Y(24)= 7.47762050886
X(25)= 13       Y(25)= 8.00000000002
X(26)= 13.5     Y(26)= 8.44581002658
X(27)= 14       Y(27)= 9.00000000002
X(28)= 14.5     Y(28)= 9.73913938468
X(29)= 15       Y(29)= 9.99999999997
X(30)= 15.5     Y(30)= 9.22263243416
X(31)= 16       Y(31)= 8.00000000003
X(32)= 16.5     Y(32)= 6.99533087627
X(33)= 17       Y(33)= 6.00000000001
X(34)= 17.5     Y(34)= 4.79604485264
X(35)= 18       Y(35)= 4.00000000002
X(36)= 18.5     Y(36)= 4.19549291189
X(37)= 19       Y(37)= 5.00000000012
X(38)= 19.5     Y(38)= 5.92198430205
X(39)= 20       Y(39)= 6.00000000004
X(40)= 20.5     Y(40)= 5.24156980045
X(41)= 21       Y(41)= 3.99999999977
X(42)= 21.5     Y(42)= 3.73673617613
X(43)= 22       Y(43)= 7.99999999983
X(44)= 22.5     Y(44)= 7.43648541629
X(45)= 23       Y(45)= 6.99999999996
X(46)= 23.5     Y(46)= 6.51732215918
X(47)= 24       Y(47)= 6.00000000004
X(48)= 24.5     Y(48)= 5.49422594694
X(49)= 25       Y(49)= 5.00000000001
```

Program 15

Title: **On-Line Spectral Analysis (OLSA)**

Authors: R.J. Peterson
D.L. Raschella
J.R. Uchida
Dept. of Chemistry
University of Tennessee
Knoxville, TN

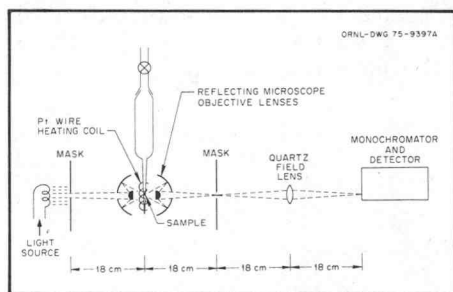Memory Requirement: 32K

Peripherals: DVM
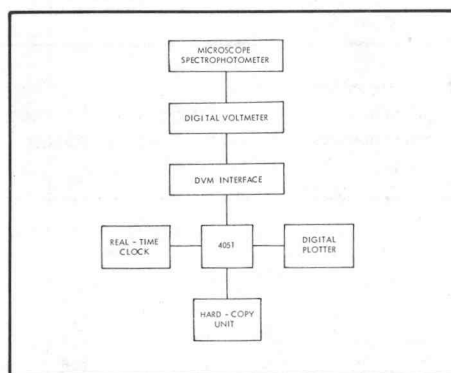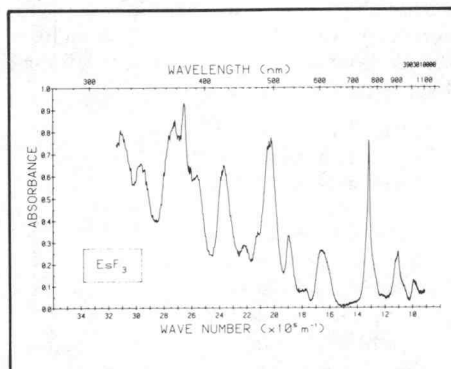TransEra 641
4662 Plotter

Statements: 1327

Files: 5 ASCII Program
Requires dedicated tape

The program acquires spectrophotometric data from a digital voltmeter on a real-time basis. The data are recorded on magnetic tape and are subsequently analyzed and plotted. The resulting spectra may be displayed in several formats on either the 4050 Screen or the 4662 Plotter. Absorbance is plotted versus wave number and wave length. Scale expansions and spectrum flattening routines are provided.

The program is divided into four segments: input, baseline fit, plotting and display/edit routines. At the end of each segment, the operator can initiate the overlaying of the next segment or branching to another segment through the User-Definable Keys.

Program 16

Title: **On-Line Calorimetry Data Acquisition and Analysis (DCAL)**

Authors: J.R. Peterson
D.L. Raschella
J.R. Uchida
Dept of Chemistry
University of Tennessee
Knoxville, TN

Memory Requirement: 32K

Peripherals: Digital Voltmeter
Hewlett Packard 3495A
Scanner
TransEra 641
4924 Tape Drive
4662 Plotter

Statements: 1485

Files: 6 ASCII Program
Requires dedicated tape

The program acquires calorimetric data from a digital voltmeter and an HP 3495A Scanner on a real-time basis. Using a thermistor in the microcalorimeter, the changes in temperature are detected as changes in resistance. A Wheatstone bridge is used to measure this resistance change. The change of resistance is monitored by the bridge detector. The output of the bridge detector and the voltages E_h and E_{std} are input to the 3495A Scanner. The 4050 System commands the scanner to connect the appropriate channel. It then directs the DVM to read the voltage and send it to the 4050 System, where it's stored on tape. The program operates on an interrupt mode, with the operator inputting bridge resistance values and initiating action by depressing appropriate User-Definable Keys. Reading rates may be altered. Experimental data that are collected consist of bridge calibrations, calibration heatings, and the dissolution reaction heat of the sample.

The data analysis/evaluation routine performs drift line extrapolations and all integrations; the results are stored on magnetic tape.
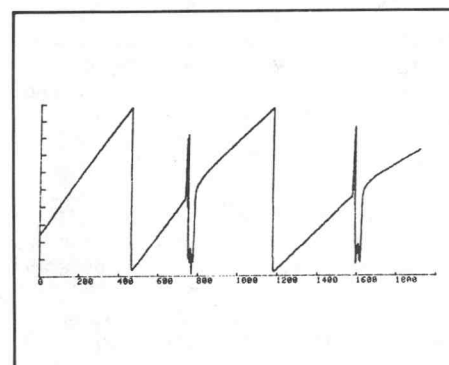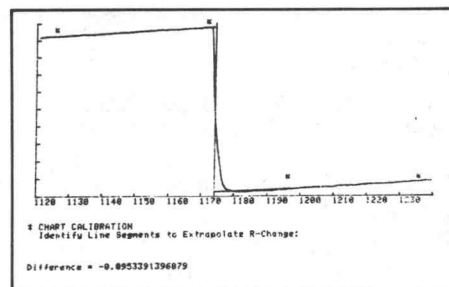
ELECTRICAL ENGINEERING T1
062-5978-01

A tape collection of 11 programs encompasses a variety of electrical engineering aids. The individual abstracts describe each program.

Three of the programs must be transferred to their individual dedicated tapes. The documentation for these programs describes how to accomplish the transfers.

Title/
Previous Abstract #

Schematic Drawing Program I
51/00-1401/0

Analysis of Logic Circuit Behavior
51/00-1403/0

SYMBOLGEN
51/00-9536/0

Failure Rate Analysis
51/00-1408/0

Sound Spectrum Presentation
51/00-5403/0

POWERFULBASS
51/00-1406/0

Thevenin's Theorem
51/00-1407/0

Lighting Intensity Distribution
51/00-3301/0

Schematic Drawing Program II
51/00-1402/0

Circuitboard Patterns
51/00-1404/0

Digital Filter Design and Implementation
51/00-1405/0

Program 1

Title: **Schematic Drawing Program I**
Author: Tektronix Intn'l Inc.
European Marketing Centre
Memory Requirement: 8K
Statements: 244
Files: 1 ASCII Program

This program allows you to interactively draw schematics on the 4050 screen. Through the User-Definable Keys select the position of component symbols and connecting lines. A choice of six standard electronic symbols plus a line segment are available: resistor, capacitor, coil, diode, transistor and earth (ground). Up to 30 symbols or line segments can be drawn in one schematic using this program.

With this program, you use the pointer (graphic cursor) to select starting and ending points where a symbol is to be located. Then you select the symbol itself. You use specified User-Definable Keys to move the pointer. This program also includes the facility to delete symbols or line segments, and to redraw the schematic after editing. No provision to store data.
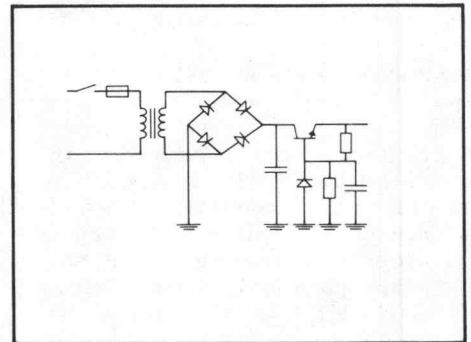
Program 2

Title: **Analysis of Logic Circuit Behavior**
Author: K.J. Orford
Physics Department
Durham University
South Road, Durham, England
Memory Requirement: 16K
Statements: 324
Files: 1 ASCII Program

This program stores the interrelationships of logic elements (gates, latches, etc.) in a complex circuit, and predicts the state of all the elements a short time later. The program then has three optional modes. It can stop and print out, or continue and predict the next state and print until stopped, or continually predict subsequent states and show a selected number (up to 12) as waveform on the display. The three modes are selected by User-Definable Keys. Up to eight input lines may be used and changed at will during execution by pressing the User-Definable Keys.

Program 3

Title: **SYMBOLGEN**

Author: E.J. Moran

GTE AE Laboratories

Northlake, IL

Memory Requirement: 16K

Peripherals: 4952 Option 2 Joystick

Option 1 Data Communications Interface

Statements: 359

Files: 1 ASCII Program

(Requires additional data file)

SYMBOLGEN converts symbols "digitized" on the 4050 graphic screen to x,y coordinates, encodes these coordinates in TEKTRONIX PLOT 10 graphic language "calls", and affixes a preamble to the calls. This forms a complete PL/I procedure which is sent to the IBM 370 (303X) host over the 4050 Option 1 Data Communications Interface. The program is now ready to be called by a PL/I main procedure for drawing and for digitizing drawings made up of the sketched symbols.

How it works on the 4050: SYMBOLGEN displays a 10 x 10 grid (100 points) on the 4050 graphic screen. Using the 4952 Option 2 Joystick and a menu of commands, the designer sketches the symbol on the screen. When the sketch is completed, the user is prompted for the textual information to define the procedure name, and for any other appropriate data that may be fixed when the program is called to draw the symbol.

Menu of commands:

m: Move to the pointed-to location from the last pointed-to location without drawing a line.

d: Draw to the pointed-to location from the last pointed-to location.

t: Draw a "terminal" (small diamond) around the pointed-to location.

a: Draw an arc of specified segment lengths (in degrees) and radius, starting at the pointed-to location from a given angle to a second given angle.

l: Locate the coordinates of a "label" at the pointed-to location and enter a single character prefix for the label.

e: End the sketch: fetch the required procedure textual data and send the PL/I program to the host computer.

Applications: SYMBOLGEN was used to generate a set of 24 symbol routines for graphic symbols used in constructing an analog electronic circuit schematic drawing. SYMBOLGEN was also used to generate block letters for title pages of some applications programs in PL/I. With revision, the program can be made to produce FORTRAN or other language symbol drawing routines.

```
SYMBOLS.PLI(TRANSIS)
00010  TRANSIS :PROC (X_START,Y_START);
00020  DCL TSEND ENTRY EXTERNAL OPTIONS(FORTRAN);
00030  DCL DRAWR ENTRY(FLOAT DEC(6),FLOAT DEC(6)) OPTIONS(FORTRAN);
00040  DCL MOVER ENTRY(FLOAT DEC(6),FLOAT DEC(6)) OPTIONS(FORTRAN);
00050  DCL REL2AB ENTRY(FLOAT DEC(6),FLOAT DEC(6),FLOAT DEC(6),
00060    FLOAT DEC(6)) OPTIONS(FORTRAN);
00070  DCL MOVEA ENTRY(FLOAT DEC(6),FLOAT DEC(6)) OPTIONS(FORTRAN);
00080  DCL 1 TEXTDATA,
00090    2 SYMBOL ENTRY,
00100    2 GENERIC_NAME CHAR(8),
00110    2 LABEL,
00120      3 IDENTIFIER CHAR(8),
00130      3 COORDINATES,
00140        4 X FLOAT DEC(6),
00150        4 Y FLOAT DEC(6);
00160  DCL TRUNC BUILTIN;
00170  DCL (X9,Y9) FLOAT DEC(6);
00180  DCL SET_VALUES BIT(1);
00190  DCL (I,IV) FIXED BIN(31);
00200  DCL(X_START,Y_START,X_CTR,Y_CTR,BASE) FLOAT DEC(6);
00210  DCL NULL BUILTIN;
00220  /* DRAW ONLY */
00230  CALL MOVEA(X_START,Y_START);
00240  TEXTDATA.GENERIC_NAME= TRANSIST ;
00250  TEXTDATA.SYMBOL=TRANSIS;
00260  TEXTDATA.LABEL.IDENTIFIER=' ';
00270    CALL MOVER( 0., 55.);
00280    CALL MOVER( -5., 0.);
00290    CALL DRAWR( 5., 5.);
00300    CALL DRAWR( 5., -5.);
00310    CALL DRAWR( -5., -5.);
00320    CALL DRAWR( -5., 5.);
00330    CALL MOVER( 5., 0.);
00340    CALL DRAWR( 56., 0.);
00350    CALL DRAWR( 0., 33.);
00360    CALL DRAWR( 14., 0.);
00370    CALL DRAWR( 14., -66.);
00380    CALL DRAWR( -14., 0.);
00390    CALL DRAWR( 0., 33.);
00400    CALL MOVER( 14., 11.);
00410    CALL DRAWR( 42., 22.);
00420    CALL DRAWR( 0., 22.);
00430    CALL MOVER( 0., 0.);
00440    CALL MOVER( -5., 0.);
00450    CALL DRAWR( 5., 5.);
00460    CALL DRAWR( 5., -5.);
00470    CALL DRAWR( -5., -5.);
00480    CALL DRAWR( -5., 5.);
00490    CALL MOVER( 5., 0.);
00500    CALL MOVER( -42., -66.);
00510    CALL DRAWR( 42., -22.);
00520    CALL DRAWR( 0., 11.);
00530    CALL DRAWR( -14., -11.);
00540    CALL DRAWR( 14., 0.);
00550    CALL DRAWR( 0., -22.);
00560    CALL MOVER( 0., 0.);
00570    CALL MOVER( -5., 0.);
00580    CALL DRAWR( 5., 5.);
00590    CALL DRAWR( 5., -5.);
00600    CALL DRAWR( -5., -5.);
00610    CALL DRAWR( -5., 5.);
00620    CALL MOVER( 5., 0.);
00630  CALL TSEND;
00640  END TRANSIS;
READY
```


COMPONENT MENU DICTIONARY

Type carriage return to continue:

Program 4

Title: Failure Rate Analysis
Author: W. E. Price
　　　　Computer Sciences Corp.
　　　　Atlanta, GA
Memory Requirement: 32K
Peripherals: Optional — 4662 Plotter
　　　　　　　　　　　 4642 Printer
Statements: 892
Files: 1 ASCII Program

Failure Rate Analysis determines either a subsystem's or a subassembly's reliability and total mean time to failure (MTTF) during a specified operating time. You may choose from three types of analysis:

　　Parts Count Prediction
　　Part Stress Analysis with Redundant
　　Circuits Only
　　Part Stress Analysis with Redundant
　　Subassemblies and Circuits

Parts Count Prediction. In the early stages of development, parts count prediction can be used to produce "ball park" values. Data preparation is simple and the operations within the program are not complex.

Part Stress Analysis with Redundant Circuits Only. Most of the subassemblies are not redundant, therefore, this allows you to calculate the failure rates in a mode where you can only be concerned with redundant circuits.

Part Stress Analysis with Redundant Subassemblies and Circuits. When redundant subassemblies do exist, this section automatically calculates the subassembly failure rate as it does in Part Stress Analysis (above) and quantifies it before calculating the total subsystem data.

The program prompts you for general input:

　　Number of subassemblies
　　Number of locations per subassembly
　　Subsytem name
　　Assembly/subassembly name
　　Operating hours
　　Number of circuits/LRU's
　　Circuit name
　　Number of components per circuit
　　Procedure to use:
　　　　Inspection formulae
　　　　Redundancy factors
　　　　No redundancy
　　　　Repair rate formula
　　Circuit's quantity

The component calculation depends upon the type of analysis that has been selected. Parts Count Prediction determines the failure rate using this formula:

$$F = \lambda_G \cdot \pi_Q \cdot Q \quad \text{(FAILURE RATE)}$$

Where,

λ_G = Generic Failure Rate

π_Q = Quality Factor

Q = Quantity

Part Stress Analysis determines the failure rate for each part from one of these equations:

1. Non Microelectronic Parts

$$F = \lambda_B \times (\pi\text{'s}) \times Q \text{ (FAILURE RATE)}$$

Where,

λ_B = Base Failure Rate

π's = Parameter Values (i.e. Quality and Stress Factors)

Q = Quantity

2. Microelectronic Parts

$$F = \lambda_p \times Q \text{ (FAILURE RATE)}$$
Where,

Q = Quantity

$$\lambda_p = \pi_L \cdot \pi_Q (C_1 \pi_R + {}_2\pi_E)\pi_P$$

and

π_L: Learning Factor
π_Q: Quality Factor
π_E: Environmental Factor
π_p: Pin Factor (Nonlinear devices only)
C_1: Failure Rate #1
C_2: Failure Rate #2

If data is available for a partially complete circuit analysis, the program will prompt you for the total failures/million hours for the completed components so they won't have to be calculated again.

The circuit calculation is a collection process of all the component values. After each component's failure rate is calculated, it is added to a continuous sum of the failure rates. When the total failure rate is found for the circuit, it is used to find that circuit's reliability and MTTF.

A Reliability vs. Time plot may be had for every circuit analysis, and for a Part Stress Analysis after the total Subsystem data has been determined. A single term Poisson Distribution of a reliability may be asked for at the end of the analysis after the total subassembly or subsystem data has been calculated.

The Parts Count Prediction circuit data and subassembly data may be stored on tape. Part Stress Analysis subassembly data and the total subsystem data may also be stored on tape. You may also have stored data printed.


```
FAILURE RATE CONVERSION AND PROBABILITY OF SUCCESS VALUES
           Based on Part Stress Analysis
     Failures/hour= 4.042E-6
     Failures/year= 0.03540792
     Operating Hours: 476
     Probability of Survival/Success: Ps = e-0.001923992
     P = 0.998077857686
     Mean Time To Fail(m): 247402.276101
           TOTAL CIRCUIT DATA
     Unit Failure/million hours= 4.042
     Item Quantity: 1
     Total Failure Rate= 4.042
     Reliability: 0.998077857686
     Mean Time To Fail: 247402.276101
        Subsystem: POWER
Assy./Subassy.: 7.5 or 20 KVA UPS
     Circuit #1: Rectifier Leg
  NON REDUNDANT CIRCUITS
```

RELIABILITY vs. TIME
POWER　　Lambda= 4.042E-6 Failures·hr.
7.5 or 20 KVA UPS Subassembly　Circuit #1: Rectifier Leg

Program 5

Title: **Sound Spectrum Presentation**
Author: Norman D. Taylor
    General Electric
    Evandale, OH
Memory Requirement: 16K
Peripherals: Rockland FFT 512/S
Statements: 131
Files: 1 ASCII Program

This program reads the values for a one-third octave sound spectrum from a Rockland Analyzer, calculates Overall Sound Pressure Level (OASPL) and plots this data on the 4050 System and generates a hard copy.

The program interrogates the Analyzer to determine the frequency range that has been analyzed and the gain settings, both coarse and fine. Then the coordinate axes are drawn accordingly. The Y-axis is plotted in dB and the X-axis is frequency in Hertz (Hz). Next, the spectrum is read in from the analyzer. As it is read and plotted, the OASPL is calculated. Finally, a hard copy of the finished plot is generated.

An option is included to allow a series of OASPL's to be calculated (for instance, a line of microphones) and a listing displayed.
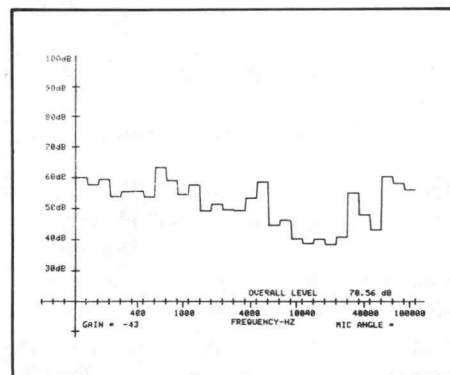
Program 6

Title: **POWERFULBASS**
Author: Ronald Glosemeyer
    Davin Lee
    Naval Ship R&D Center
    Bethesda, MD
Memory Requirement: 16K
Peripherals: Optional-4622 Plotter
Statements: 438
Files: 1 ASCII Program
POWERFULBASS-**P**rogram for **O**ptimizing **W**oofer/ **E**nclosure **R**esponse at **F**requencies **U**nder**L**ying the **B**asic **A**udio **S**ound **S**pectrum

By knowing three basic electromechanical properties of a woofer (total Q of the driver, free air resonant frequency of the driver, compliance of the driver in cubic feet), and the nominal diameter of the driver, this program allows the user to:

1. Determine the optimum enclosure volume;
or
2. Enter a desired volume (or bass cutoff frequency) and see the resulting cutoff frequency (or required enclosure volume);
and with these values:
3. See the required enclosure tuning frequency;
4. See the resulting system efficiency;
5. Obtain a plot of the theoretical frequency response in twentieth decade intervals from 10 to 200 Hz;
6. Determine the "ideal" enclosure dimensions;
or
7. Set any two enclosure dimensions and see the third;
8. "See" a scaled drawing of the completed speaker enclosure.

FREQUENCY RESPONSE OF LOUDSPEAKER SYSTEM

Program 7

Title: **Thevenin's Theorem**

Author: John G. Lingle
Tektronix, Inc.
Beaverton, OR
Memory Requirement: 16K
Statements: 378
Files: 1 ASCII Program

The program provides computer aided instruction on how to THEVENIZE. The user inputs the number of voltage sources; the program randomly selects values for the voltages and resistors. The following may be selected to solve the problem:

1. The program will progress through the solution, detailing each step.

2. The user may solve the problem. The user has the option of using the 4050 as a calculator to assist in computing the answer. Two attempts are allowed to input the correct answer. If the correct answer is not input the user may select to view the solution using the above process.

```
ASSUME THE CIRCUIT IS OPEN WHERE
THE "X" IS AND ONLY CONSIDER THE
PORTION TO THE LEFT OF THE "X".

TREAT THE CIRCUIT AS A SERIES BRANCH      V1=330    V3=220
AND CALCULATE THE VOLTAGE AT THE
POINT WHERE THE CIRCUIT WAS OPENED.

PUSH RETURN:                                R1=205    R3=125

THE VOLTAGE IS -323.2 AND IS CALLED "Voc"          X
<open circuit VOLTAGE>.

NOW COMPUTE THE PARALLEL RESISTANCE          R2=10
OF THE TWO RESISTOR BRANCHES.

PUSH RETURN:                                V2=-355

THE EQUIVALENT RESISTOR IS 9.5 AND IS CALLED Rth <Resistance Thevenin>.

TO COMPLETE THIS STEP REPLACE THE TWO RESISTOR BRANCHES
WITH THE PARALLEL EQUIVALENT AND USE THE CALCULATED Voc
FOR THE VOLTAGE SUPPLY.

PUSH RETURN:
```

```
THERE IS JUST ONE RESISTOR BRANCH
AND POWER SUPPLY LEFT THAT HAS NOT
BEEN INCLUDED YET.

CALCULATE THE VOLTAGE BETWEEN THE
LAST TWO RESISTORS.                                V3=220

PUSH RETURN:                                         R3=125

THE VOLTAGE -284.7 AT THIS JUNCTION IS    -323.2 ─WW─  9.5
THE ACTUAL VOLTAGE.

WHAT IS THE PARALLEL EQUIVALENT OF
THESE TWO RESISTORS.

PUSH RETURN:

THIS IS THE FINAL Rth AND IS 8.8

NOW THAT YOU KNOW HOW TO SOLVE THIS PROBLEM,
HOW WOULD YOU LIKE TO TRY ANOTHER ONE?
```

```
WOULD YOU LIKE TO SEE A THEVENIN PROBLEM SOLVED <Y OR N>?Y

ENTER NUMBER OF SUPPLIES  3

THEVENIN'S is a method of solving circuits with
TWO or more power supplies.

Using THEVENIN'S requires that only TWO supplies
be considered at a time.

Each complete step reduces the number of supplies
and resistive branches by one.

Eventually the circuit will be reduced to one
equivalent supply and resistor.
PUSH RETURN:
```

Program 8

Title: **Lighting Intensity Distribution**

Author: Florent van Vlasselaer
Tektronix
Belgium
Memory Requirement: 16K
Peripherals: Optional-4662 Plotter
Statements: 231 plus a 30 x 10 table

Files: 1 ASCII Program
1 ASCII Data

The program calculates the lighting intensity distribution over a user-specified area. The output is in the form of a grid showing the intensity in the individual squares. Total intensity and average intensity per square are also given.

The user gives the dimensions of the area, position and height of the lamp, its type and strength and the point in the area at which the lamp is directed.

Using a table for that type of lamp, the program calculates the distribution and outputs it in the form of a grid. The grid is labeled and the total intensity and average intensity per square is given. Output on the plotter is optional.

The program was conceived specifically for football fields but can be used for any rectangular area.

Only the table of values for projector type 'D' are given here; the values for projector type 'C' must be implemented by the user. This type uses a much larger matrix and would need a 32K 4050 System.
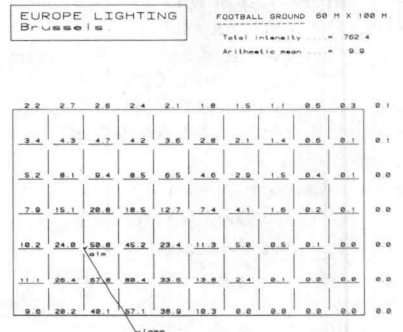
Program 9

Title: **Schematic Drawing Program II**
Author: Tektronix International Inc.
European Marketing Centre
Memory Requirement: 16K
Statements: 445
Files: 1 ASCII Program
Requires dedicated Tape

This program operates the same as the Schematic Drawing Program I described above. This program, however, offers a choice of eight standard electronic symbols plus a line segment: resistor, capacitor, coil, diode, transistor, MOSFET, variable capacitor and earth (ground). Up to 50 symbols or line segments can be drawn in one schematic using this program.

The schematic may be stored on tape, recalled, and redrawn or edited.

Program 10

Title: **Circuitboard Patterns**
Author: Jan Beckman
Imperial Oil Ltd.
Edmonton, Alberta, Canada
Memory Requirements: 16K
Peripherals: 4051R05 Binary ROM Pack
4952 Joystick
4662 Plotter
Statements: 502
Files: 1 ASCII Program
3 ASCII Data (2 are examples)
2 Binary Program
2 Scratch (for examples)
Requires dedicated tape

You can draw circuitboard patterns on the 4050 screen with this program. Once you are satisfied with the pattern, draw it on the 4662 Plotter. Use a Mylar pen in the Plotter and draw your foil pattern on a copper board right on the Plotter. The Mylar pen works as an etch-resist pencil would.

Functions:

Board size (can be changed during design)
Scaling
Optional Grid at 0.1 inch (standard DIP size)
Generate data and store
Retrieve existing data
Update data
Components
Conductor
Ground Conductor (full width conductor)
IC—8, 10 or 12 Pin Round or DIP's (horizontal or vertical) or other pin numbers specifying your own width
Solderpad
Resistor Pads
Edge Connector Strip
Transistor Pads
Move without drawing
End (closes all files)

Test data is included to familiarize yourself with the program. Note precautions on program MARKing data files automatically.
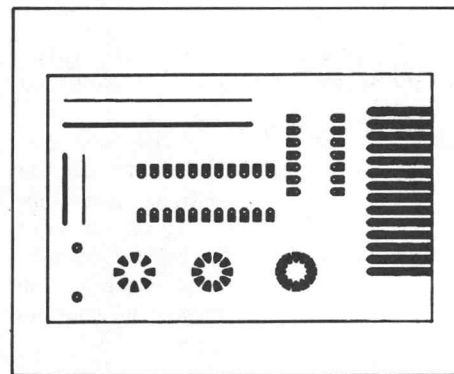
Program 11

Title: **Digital Filter Design and Implementation**
Author: Ralph Deutsch
Deutsch Research Laboratories
Sherman Oaks, CA
Memory Requirements: 32K
Peripherals: Optional-4662 Plotter
Statements: 729
Files: 2 ASCII Progarm
3 Binary Data (examples)
Requires dedicated tape

From user design specifications, the program computes the digital filter coefficients for a low-pass, high-pass, band-pass, or band-reject filter. Steady state and transient responses are plotted. The output results can be used to software or hardware implement the filter.

The program's interactive technique allows near-optimal design for a digital filter to be rapidly approached using trial data. The user can specify the order of the filter, critical edge frequencies, sampling frequency, and attenuation in the reject bands. Inconsistent input data is detected and error messages displayed.

The program displays the zeroes and poles for each case in a form suitable for a hardware implementation of the digital filter. A second program can be called which will execute the digital filter on user supplied data.

Functions provided by the User-Definable Keys:

Run the program (the design process)
Run and plot transient response
Compute and plot amplitude/frequency response for 50 points
Compute and plot amplitude/frequency response for 200 points
Load the Digital Filter Implementation program
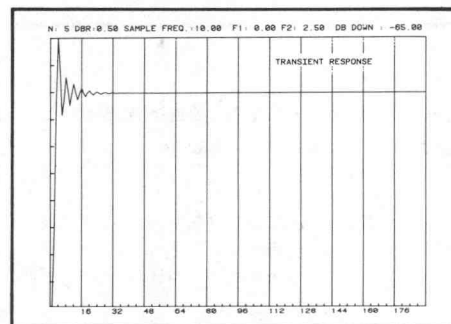
GRAPHING T1
062-5964-01

GRAPHING T1 is a tape collection of seven graphing programs from which you may create a variety of graphs, including line, bar, pie, 3-D. Various degrees of data manipulation are available. The individual abstracts describe each program.

Use these programs to generate presentation quality graphs for overheads or reports.

Title/
Previous Abstract #

Timeseries III
51/07-0909/0

Bargraph II
51/07-0907/1

Pie Chart with Shading and Transparency Routines
51/00-9544/0

"Y" Axis Graph — 12 Month Format
51/00-0905/0

3-D Data Plot
51/00-9506/0

Q-Plot
51/00-9534/0

Spider Web Charts
51/00-9521/0

Program 1

Title: **Timeseries III**
Author: Mallroy M. Green
        Dept. of HUD
        Washington, D.C.
Memory Requirement: 32K

Peripherals: 4662/4663 Plotter
        Optional-4907 File Manager
Statements: 4072
Files: 10 ASCII Program

Timeseries III is an easy-to-use interactive program which prompts the user for graph parameters.

Maximum parameters:

4 data lines or bar shading types
20 time periods
3 title lines
72 characters per title line
30 characters per data line label
60 characters for X-axis label
60 characters for Y-axis label
3 extra text strings
72 characters per extra text string
choice of symbols

Parameters may be adjusted within memory limits, by decreasing some and increasing others.

Graphs are easily modified through the User-Definable Keys.

Time periods may be added to or deleted from either end of the X-axis. Lines/bars may be added or deleted, their legends/labels changed or moved. Individual data items may be changed or a series may be changed.

Chart descriptions can be saved to tape or disk.

Output to the plotter in one color or multiple colors. Plot may be rotated 90 degrees. Tabular and graphic display also on the screen.

Program 2

Title: **Bargraph II**
Author: Mallory M. Green
U.S. Dept. of H.U.D.
Washington, D.C.
Memory Requirement: 32K
Peripherals: 4662 Plotter
Optional-4907 File Manager
Statements: 1524
Files: 4 ASCII Program
Requires data files for storage on same tape/disk

A program designed to generate professional horizontal or vertical formatted bar graphs in a simple interactive manner.

The program has the following features:

1. An easy to use prompted chart definition mode; easy modification of charts via the User-Definable Keys.

2. Will plot a maximum of up to 4 bar types for up to 20 groups (points). A set of bars may be deleted or added.

3. Prompted keyboard entry for 3 graph title lines, group labels, bar labels, axes labels.

4. Axis scale may be specified.

5. Horizontal or vertical bar plots.

6. Automatic layout of centered and proportional charts.

7. The following output methods:

   a. Tabular display on screen
   b. Drawn on screen
   c. Plotted on plotter in one color
   d. Plotted on plotter in multiple colors

8. Three program overlay modes:

   a. ASCII tape overlaying
   b. Binary tape overlaying
   c. Binary disk overlaying

9. Chart description may be saved on tape or disk

10. Fully compatible in approach and data format with Timeseries II.

Program 3

Title: **Pie Chart with Shading and Transparency Routines**
Author: Fred Fachet
Social Security Administration
Chicago, IL
Memory Requirement: 32K
Peripherals: 4662 Plotter
Statements: 655
Files: 1 ASCII Program

The program allows the user to create a pie chart, and optionally, alter data values, main title, subtitle and segment or slice labels. The pie is previewed on the 4050 screen, and can be plotted on the 4662 Plotter. In the Plotter mode, the user has the option of changing pen colors for the title (main and sub), one or more segments of the pie, and the border.

The user may also elect to offset one or more segments of the pie. For additional emphasis, apart from color options on the 4662 Plotter, the user may also use the shading routine to outline the segment and have it shaded.

The transparency routines allow the user to annotate the chart with standard horizontal or vertical text. The user may also select different character fonts to label the pie chart with non-standard characters for foreign languages or currencies.

The shade and transparency routines may be used independently to highlight and/or annotate, make geometric figures, produce text, overhead transparencies, report cover sheets and so on.

User-Definable Keys Provide:

Pie Chart
Change Data
Screen
Plotter
Shade
Transparency
Fonts
Menu/Restart

User Prompted Input:

Title
Sub-title
Number of segments
Labels (12 characters maximum)
Data values

The shading program was modified from TEKniques Vol. 3, No. 1 Programming Tip. Special thanks go to Nathan Oxhandler (Tektronix, Inc., Santa Clara Field Office) for his conception of the exploding pie chart technique.

Program 4

Title: **"Y" Axis Graph—12 Month Format**

Author: Robert Pilkington
AT&T Long Lines
Bedminster, NJ

Memory Requirement: 24K

Statements: 570

Files: 1 ASCII Program
4 Binary Data (examples)
Requires 45 premarked data files on same tape

A solid line curve, a dashed line curve, shaded bars, or any combination of the three can be created easily on a graph with titles and labels by using this monthly scale adjustable "Y" axis graphing program.

All titles and labels are automatically spaced and centered around the axis. Up to four main title lines can be entered with one "X" axis title, a three position "Y" axis title, and a legend label for each plot curve. The user can select bar shadings as well (empty bars, solid fill or cross hatch). Y-axis range and tic intervals may be specified. A parameter and data listing can be accessed before or after the graph is displayed.

Data for all three plot modes can be added, deleted or changed. All data and parameters can be saved or retrieved from pre-marked binary files on the same 4050 data cartridge.

Limitations: "Y" axis tic labels up to six characters using whole numbers and seven characters using decimal numbers including decimal point and dollar sign. The scales must be positive numbers. The size and position of the graph on the screen is constant and stationary.
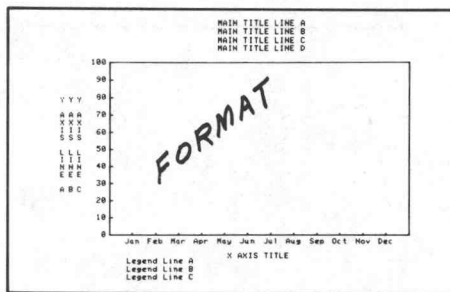
Program 5

Title: **3-D Data Plot**

Author: Michael Poe
Tektronix, Inc.
Wilsonville, OR

Memory Requirement: 16K

Statements: 509

Files: 1 ASCII Program

This program graphically plots on the screen of the TEKTRONIX 4050 the contents of any M x N matrix. This matrix is entered and can be corrected with the program. There are 6 different methods of data presentation, two of which are in three dimensional perspective.

1. 3-D Histogram
2. 3-D Point Plot
3. Ranged Cell Graph
4. Signed Cell Graph
5. Bar Histogram
6. Point Plot

A default viewpoint is calculated for each 3-D plot, but the user may rotate the plot or change the perspective.

A comparison of two rows of columns of data or a selection of part of an array may also be selected for plotting.
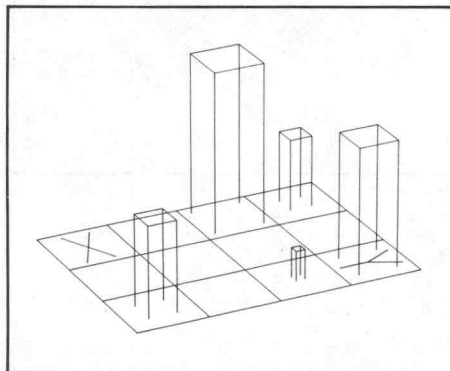
Program 6

Title: **Q-Plot**

Author: Captain S.K. Sanford
       Aberdeen Proving Ground, MD

Memory Requirement: 32K

Peripherals: Optional-4924 Tape Drive

Statements: 866

Files: 1 ASCII Program
      Automatically marks data file on
      auxillary tape drive

The program is a quick plotting utility which prompts the user for positive data (default 50 values) for up to ten curves (to be plotted on the same set of axes), and displays these curves on the 4050 screen using either linear or log scales (or a combination of both), with labeled axes, graph, and line markers. A legend is printed at the bottom of the graph, including the data ranges. A checkpoint restart feature may be optionally employed which will save the data and graphing options selected automatically to allow the graph to be re-displayed at a later time.

Program 7

Title: **Spider Web Charts**

Author: Tom Price
      Lorillard Research
      Greensboro, NC

Memory Requirement: 8K

Statements: 79

Files: 1 ASCII Program

This program produces spider web profiles for any number of parameters. Such profiles are useful in the concise presentation of multiple properties related to an item on a single graph. Rapid comparisons between items are greatly facilitated. This type of presentation is widely used in the tobacco industry for the comparison of flavor properties between different brands.

The number of properties, scale on which they are rated and graph titles are contained in data statements and are easily modified.

Graph title and property values are input.
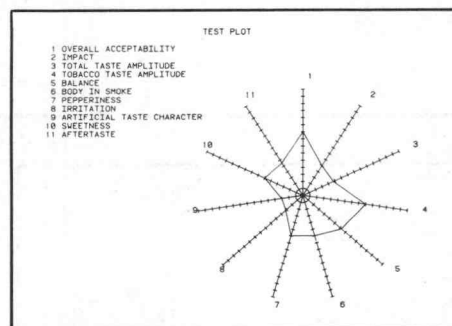
GRAPHING T2
062-5965-01

GRAPHING T2 is a tape collection of seven graphing programs from which you may create a variety of graphs, including line, bar, pie, 3-D. Various degrees of data manipulation are available. The individual abstracts describe each program.

Use these programs to generate presentation quality graphs for overheads or reports.

Title/
Previous Abstract #

Bargraph III
51/07-0910/0

Timeseries II
51/07-0906/1

Pie Chart Routine
51/00-9533/0

Pie Chart for Hard Copy Unit
51/00-9514/0

3-D With Perspective
51/00-9507/0

Speak/Plot
51/00-6121/0

Forms Design
51/00-9515/0

Program 1

Title: **Bargraph III**
Author: Mallory M. Green
Dept. of HUD
Washington, D.C.
Memory Requirement: 32K
Peripherals: 4662/4663 Plotter
Optional-4907 File Manager
Statements: 4572
Files: 10 ASCII Program

Bargraph III is an easy-to-use interactive bar chart program. The user defines a bar graph by responding to Bargraph III prompts.

A group of bars consists of one or more bars with different shading patterns. The bars may be horizontal or vertical; and they may be stacked, overlayed or comparative.

Maximum parameters:

12 groups of bars
4 bar types
3 title lines
72 characters per title line
30 characters per data set legend
20 characters per group label
3 extra text strings
72 characters per extra text string

Parameters may be adjusted within memory limits, by decreasing some and increasing others.

All titles, labels and text are drawn at user-specified scales. Various lines modes and data symbols are user selectable.

Chart modification, including adding/deleting bars or groups of bars, can be done easily through the User-Definable Keys.

Chart descriptions can be saved to tape or disk.

Output to the plotter in one color or multiple colors. Plot may be rotated 90 degrees. Tabular and graphic display also on the screen.

GENERAL SPENDING PATTERNS

A GANTT CHART

(12 WEEKS - JAN 7 THRU MARCH 29, 1980)

TEN LARGEST U S CITIES
(POPULATION CHANGE FROM 1970 TO 1978)

Program 2

Title: **Timeseries II**
Author: Mallory M. Green
       U.S. Dept. of H.U.D.
       Washington, D.C.
Memory Requirement: 32K
Peripherals: 4952 Joystick or
           4662 Plotter
           Optional-4907 File Manager
                4051R05 Binary
                ROM Pack
Statements: 1199
Files: 3 ASCII Program
     Requires data files for storage on same
     tape/disk

A program designed to generate professional timeseries charts in a simple interactive manner.

The program has the following features:

1. An easy to use prompted chart definition mode; easy modification of charts via the User-Definable keys.

2. Can draw up to 6 lines for up to 35 time periods. 4 line types available; 1 symbol type. Lines may be deleted or added.

3. Time periods such as seconds, minutes, hours, days, weeks, months or years can be used. Time periods may be added to or deleted from either end of the X-axis.

4. Prompted keyboard entry of 3 graph title lines, X-axis & Y-axis labels, line labels, and data. All may be edited; line labels may be repositioned.

5. Y-axis scale may be specified.

6. Horizontal or vertical grid optional.

7. Missing value indicator.

8. The following output methods:

   a. Tabular display on screen
   b. Drawn on screen
   c. Plotted on plotter in one color
   d. Plotted on plotter in multiple colors

9. Three program overlay modes:

   a. ASCII tape overlaying
   b. Binary tape overlaying
   c. Binary disk overlaying

10. Chart description may be saved on tape or disk.

11. Fully compatible in approach and data format with Bargraph II.

Program 3

Title: **Pie Chart**
Author: Herman D'Hondt
       Tektronix Pty, Ltd.
       Sydney, Australia
Memory Requirement: 8K
Peripherals: Optional-4662 Plotter
Statements: 172
Files: 1 ASCII Program

The program will draw a pie chart diagram of data entered from the keyboard or from tape. The output shows a title, a subtitle and the pie chart with label and data values for each pie. Output may be to the screen or to the 4662 Plotter.

Data values may be added or edited, using the User-Definable Keys.

Input of:

   Graph title
   Subtitle (up to 25 characters)
   Up to 20 data values
   Data value label (up to 10 characters)
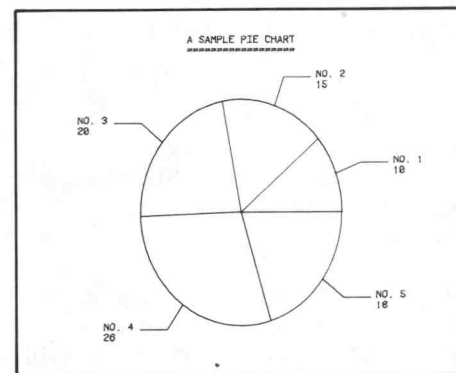
Program 4

Title: **Pie Chart for Hard Copy**
Author: Dr. P.C. Holman
       University of Wisconsin
       Stevens Point, WI
Memory Requirement: 16K
Statements: 302
Files: 1 ASCII Program

Data to be presented as a pie chart is entered on the 4050 keyboard. The data is then presented as a table of original data, percent conversions, and degrees of a circle conversions.
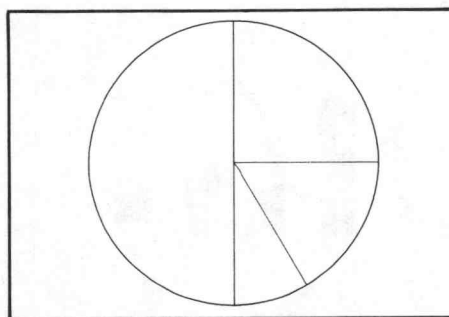
The pie chart may be re-drawn larger, smaller, or the original size in any of 7 screen locations. Once the hard copy is made, text may be manually typed on it.

The program is tutorial.

Program 5

Title: **3-D With Perspective**
Author: Will Gallant
       Tektronix, Inc.
       Wilsonville, OR
Memory Requirement: 16K
Peripherals: Optional-4662 Plotter
Statements: 381
Files: 1 ASCII Program

The program accepts up to 500 points in space defined by X, Y, Z coordinates and a table defining their interconnection (program operation via the User-Definable Keys). A viewpoint in space and nose to screen distance is also requested. Data may be input from tape files or the keyboard and stored in a pre-marked file. No hidden line elimination is attempted. A training example is built-in. The 3-D algorithm was suggested in Principles of Interactive Computer Graphics by Newman and Sproull; McGraw-Hill publishers.
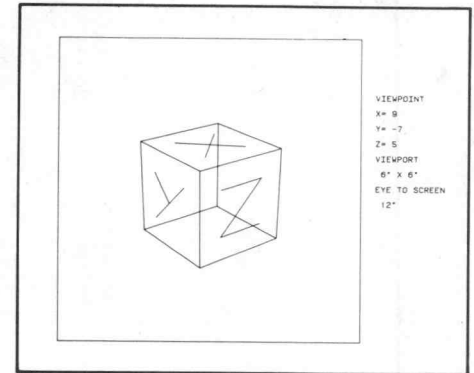
Program 6

Title: **Speak/Plot**
Author: Scott Adams
      State of Nevada
      Central Data Processing
      Carson City, NV
Memory Requirement: 24K
Peripherals: Option 1 Data Communications Interface
      4662 Plotter
      Optional-4051R05 Binary ROM
Statements: 228
Files: 1 ASCII Program
      Requires a data file

The program provides permanent copies of graphs produced using the SPEAKEASY System. Simple and flexible interaction between the user, Speakeasy graphics, and the 4662 Plotter is provided. Also ADDGRAPH and overlay capabilities may be used and will store and retrieve graph data for future reference. The program translates the character encoded graphics data into numeric data suitable for use by the 4050 and the 4662 Plotter. The groups of characters representing numeric coordinates are identified, then changed to their numeric ASCII code, combined to form the numeric equivalent, and stored in X and Y arrays. When decoding is complete the graph is drawn on the screen. The graph may then be plotted on the plotter, corrections made, and stored on tape. The flexibility allowed the user is provided by the 4050's ability to switch to and from the Terminal mode without the host computer (or SPEAKEASY's) knowledge, and in the use of the tape cartridge as intermediate storage for the graphic data (using the special data communications capabilities of the 4050 and the Data Communications Interface).
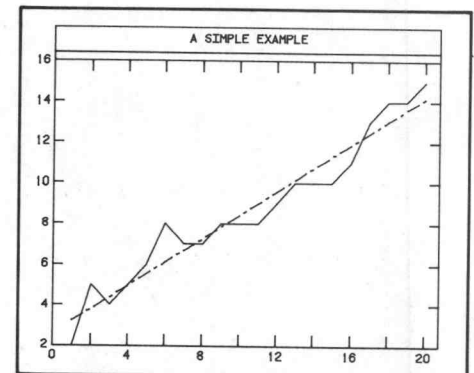
Program 7

Title: **Forms Design**
Author: Dr. P.C. Holman
      University of Wisconsin
      Stevens Point, WI
Memory Requirement: 24K
Statements: 477
Files: 3 ASCII Program

This is a program for designing any form or straight-line geometric pattern. The screen is treated as a graph and the user is prompted for horizontal and vertical coordinates. The pattern may be drawn after any sequence of coordinate points input and the user may review his coordinate points after each draw. Changes are allowed throughout design construction.

Two methods are employed:

1. Coordinate pairs for all line segments are input. They are then drawn and changes may be made and additional lines may be added.

2. Point coordinates to draw a line from point A to point B are input. Line and corners may be added. The pattern may be previewed after each addition. Coordinates may be listed and changed.

Text is not provided for.

GRAPHING T3
062-5966-01

GRAPHING T3 is a tape collection of six graphing programs from which you may create a variety of graphs including line, bar, polar, etc. Various degrees of data manipulation are available including smoothing and least squares fitting. A routine is included which transfers PLOT 10 graphic data to 4050 GDU data. The individual abstracts describe each program.

Three of the programs must be transferred to their own dedicated tape. The documentation for each describes the steps to accomplish this.

Title/
Previous Abstract #

Calendar Plot
51/00-0901/0
Regular Plot
51/00-0908/0
Plot 10 to GDU Graphic Data Converter
51/00-9542/0
Data Graphing
51/00-9523/0
General Graphing
51/00-9524/0
GRAFUS
51/07-9530/0

Program 1

Title: **Calendar Plot**
Author: Aaron Eisenbach
　　　　　 Tektronix, Inc.
　　　　　 Baltimore, MD
Memory Requirement: 32K
Peripherals: Optional-4662 Plotter

Statements: 1099
Files: 1 ASCII Program

CALENDAR PLOT is an interactive program which quickly allows you to produce single or multiple curve plot graphs on a scale of Data vs. Months axes.

It is sometimes difficult to analyze data from different periods of time, which are plotted on the same chart. With this program you can select the least confusing graph. It is useful for comparing sales, financial, or other business data.

The program includes two major categories.

1. Graphs of data for months within a calendar year period.
   a. Graph of one period
   b. Comparison of two periods
   c. Comparison of three periods

2. Graph of data for months which start in one year and end in the following year.
   a. Graph for one period
   b. Comparison graph for two periods
   c. Comparison graph for three periods

For graphs comparing 2 or 3 periods, data begins in the same month for each period but may end at different months (12 month maximum).

A plot includes one or more of the following plot formats:

1. Line
2. Dashed Line
3. Bar
4. Shaded Bar

Each choice of graph requires new data input. No provision is made to store data.

Program 2

Title: **Regular Plot**

Author: Dr. R.J. Reimann
Boise State University
Boise, ID

Memory Requirements: 32K

Peripherals: 4662 Plotter

Statements: 867

Files: 1 ASCII Program
1 Binary Data (example)

A general graphics program developed for industrial market analysis. It provides line and bar plots with regularly spaced X-axis entries. Features include:

1. Up to 10 curves and up to 12 data points.
2. 4 Line types, bars open or horizontally shaded.
3. Graph title, Y-axis title, X-axis tic labels, curve legends.
4. Curves may be added or deleted.
5. Labels may be corrected.
6. Data may be changed but no deletion or insertion of data points.
7. Allowance for negative data.
8. Aligned data tables.
9. Data storage/recall.
10. Linear regression.
11. Correction factors may be entered manually or from tape to account for scale change with time.
12. Autoscaling of the Y-axis but tic intervals may be specified. May specify Y-intercept of X-axis.

COMPARISON LEVELS WITH BAR PLOTS
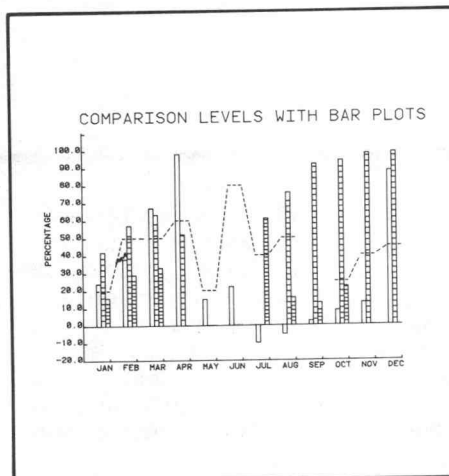
Program 3

Title: **Plot 10 to GDU Graphic Data Converter**

Author: Paul J. Kristof
Steve Duncan
Tektronix, Inc.
Wilsonville, OR

Memory Requirement: 16K

Peripherals: 4924 Tape Drive or
4907 File Manager

Statements: 248

Files: 1 ASCII Program
Requires Pre-MARKed data file if using 4924

The program takes graphic character data (PLOT 10) from a 128 or 256 byte recorded data cartridge, converts it to Tek GDUs (graphic display units), and stores it on an auxiliary tape drive or the 4907 disk unit. This allows plots created on other computer systems to be displayed on the 4050 Series using the MOVE and DRAW commands.

The data can be picked from any file on a 256 byte tape or a 128 byte tape. Data is formatted as follows: if the X value is negative, the data pair is a MOVE. All other values indicated a DRAW command. A sample program is included which will display the plots after they have been converted.

The program compensates for XLOY, so extended addressing data may be converted. However, optimized graphics (see the 4014 manual) cannot be converted using this program.

Alphanumeric data is printed to the 4050 screen during the conversion process, but won't be saved.

Program 4

Title: **Data Graphing**

Author: Chuck Eng
Tektronix, Inc.
Wilsonville, OR

Memory Requirement: 32K

Peripherals: Optional-4662 Plotter

Statements: 996

Files: 1 ASCII Program
4 ASCII Data
Requires Pre-marked data files &
dedicated tape

Create graphs quickly and easily with Data Graphing. Computer expertise is not required since the user is prompted for the minimal inputs. Up to six curves of negative/positive data may be created from:

Keyboard input
Sum of all previous curves
Average of all previous curves
Cumulative sum of the previous curve
Least squares fit of the previous curves
Data from tape file

X-axis values may be user-input or auto-sequence. Graph design allows selection of:

Type of curve (bar, solid, phantom, dash) with variations of each (h/w generated on 4054)
Grid (optional—horizontal)
Labels (user-input or auto-sequencing by month or number, may be staggered)
Hidden line removal
Scaling of Y-axis (automatic or manual)
Saving data for curves and/or graph
Pen color changes

Other functions allow changes in curve data or graph parameters, listing of data, drawing to the 4050 screen or 4662 Plotter and examples.

The program includes the program file, and four sample data files. Additional data files must be pre-MARKed for storage of curve and graph data

TEKTRONIX NET SALES
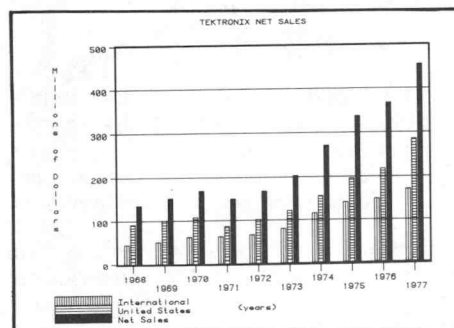
Program 5

Title: **General Graphing**
Author: Glenn Roy Hottel
        Purdue University
        West Lafayette, IN
Memory Requirement: 32K
Peripherals: 4051R05 Binary ROM
          Optional-4662 Plotter
Statements: 2419
Files: 1 ASCII Program
     7 Binary Program
     Pre-marked data files
     Requires dedicated tape
29 routines are available, arranged in 8 blocks of related functions. The blocks are joined together using the LINK command.

Block 1:

    Instructions
    Program initializer

Block 2:

    Discontinue graphing
    Change old data (input data point number)
    Input data
        Read data from tape
        User defined function
        Enter from keyboard (X and Y input or Y input only; up to 512 data points per axis)
        Retrieve graph copying data (graph previously created using the plotter)

    Insert/Add new data
        Add data to end of present data set
        Insert data into interior of present data set

    Write data onto tape (pre-marked ASCII)
    Delete old data

Block 3:

    Set X and Y axis range
    Set X and Y axis tic interval
        Major tics numbered; minor tics not
        Minor tics optional
    Set X and Y axis labels
    Axis type: Log/Linear
    Graph symbol placement (each point, last point only, every nth point)
    Set title label
    Points/Line/Histogram (different size dashes for different lines)
    Choose graph symbol (asterisk, circle, dash, point, rectangle, star, triangle; may be rotated and/or filled in)
    Automatic prompting (block 3 only)
    Size of paper to use (default = 3 common sizes, input actual, bound edge—top or left)

Block 4:

    Place graph on screen
    Place graph on plotter
    Parts of graph to show (complete plot, axis only, graph only, labels only)

Block 5:

    List data on screen
    List data on plotter
    Set X and Y data label (20 characters centered)

Block 6:

    Least squares fitting

Block 7:

    Smooth line/dashes

Block 8:

    Graph copying (input via plotter)
        Up to 8 sets of data points or lines or combinations
        Each set may contain up to 512 points
        Stored in files 8-16 on program tape
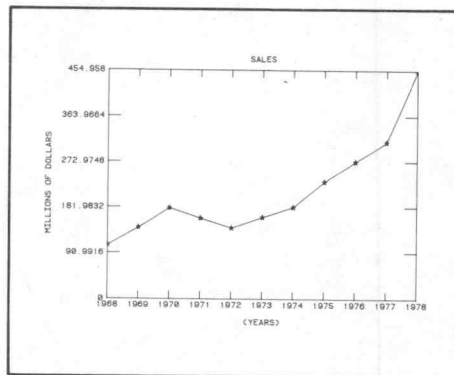
Program 6

Title: **GRAFUS**
Author: GCS Group
        Tektronix, Inc.
        Amstelveen, Holland
Memory Requirement: 16K
          Level 5 Firmware
Peripherals: 4907 File Manager
      or
      4051R05 Binary ROM
      Optional-4662 Plotter
Statements: 2180

Tape Files: 1 ASCII Program
          20 Binary Program
          Requires dedicated tape

The software package provides the user with a set of three graphing routines with selectable options which can be inserted into his/her application program.

GRAPH for drawing a curve through **user-defined** data pairs.

POLAR for drawing a curve defined by magnitudes and angles.

CURVE for drawing a curve defined by coefficients and exponents.
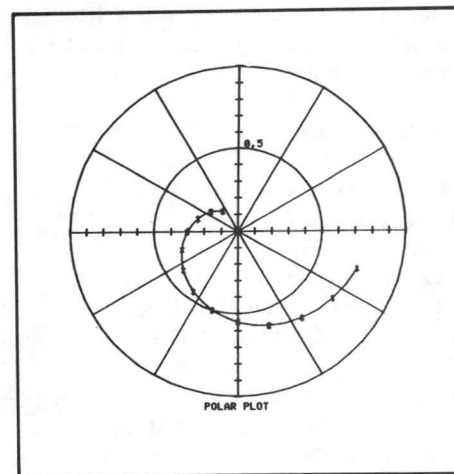
The selectable options include:

    Autoscaling
    Lin-lin, semi-log, log-log axis systems
    Curve smoothing
    Multiple curve plots (4 maximum)
    Line types (solid, dot, dash, dot-dash)
    Graphic device address
    Symbol plotting (every nth point)
    Axis generation (main or supplementary for Polar)
    Check (parameters and compatibility)
    X and Y axis labels (4 characters)
    Title (72 characters)
    Viewport coordinates (set or default)
    Positive X and Y values (50 maximum)

A tutorial provides the user with the required data structures. Demos clarify the routines.

GRAFUS can be easily combined with user programs using the APPEND command.

GRAFUS is equipped with a data-checking and error-message routine.

GRAPHING D1
062-5967-01

GRAPHING D1 is a disk collection of graphing programs from which you may create a variety of graphs, including line, bar, polar, 3-D, pie. Various degrees of data manipulation are available. The individual abstracts describe each program.

Use these programs to generate presentation quality graphs for overheads or reports.

Title/
Previous Abstract #

Timeseries III
51/07-0909/0
Bargraph II
51/07-0907/1
GRAFUS
51/07-9530/0
3-D Data Plot
51/00-9506/0
Negative/Positive Bargraph
51/07-9541/0

Pie Chart with Shading and Transparency Routines
51/00-9544/0
Pie Chart for Hard Copy
51/00-9514/0

Program 1

Title: **Timeseries III**
Author: Mallroy M. Green
Dept. of HUD
Washington, D.C.
Memory Requirement: 32K

Peripherals: 4662/4663 Plotter
Optional -4907 File Manager

Statements: 4072
Files: 10 Program

Timeseries III is an easy-to-use interactive program which prompts the user for graph parameters.

Maximum parameters:

4 data lines or bar shading types
20 time periods
3 title lines
72 characters per title line
30 characters per data line label
60 characters for X-axis label
60 characters for Y-axis label
3 extra text strings
72 characters per extra text string
choice of symbols

Parameters may be adjusted within memory limits, by decreasing some and increasing others.

Graphs are easily modified through the User-Definable Keys.

Time periods may be added to or deleted from either end of the X-axis. Lines/bars may be added or deleted, their legends/labels changed or moved. Individual data items may be changed or a series may be changed.

Chart descriptions can be saved to tape or disk.

Output to the plotter in one color or multiple colors. Plot may be rotated 90 degrees. Tabular and graphic display also on the screen.

Program 2

Title: **Bargraph II**
Author: Mallory M. Green
U.S. Dept. of H.U.D.
Washington, D.C.
Memory Requirement: 32K
Peripherals: 4662 Plotter
Optional-4907 File Manager
Statements: 1493
Files: 4 Program
Requires data files for storage on same tape/disk

A program designed to generate professional horizontal or vertical formatted bar graphs in a simple interactive manner.

The program has the following features:

1. An easy to use prompted chart definition mode; easy modification of charts via the User-Definable Keys.

2. Will plot a maximum of up to 4 bar types for up to 20 groups (points). A set of bars may be deleted or added.

3. Prompted keyboard entry for 3 graph title lines, group labels, bar labels, axes labels.

4. Axis scale may be specified.

5. Horizontal or vertical bar plots.

6. Automatic layout of centered and proportional charts.

7. The following output methods:

   a. Tabular display on screen
   b. Drawn on screen
   c. Plotted on plotter in one color
   d. Plotted on plotter in multiple colors

8. Three program overlay modes:

   a. ASCII tape overlaying
   b. Binary tape overlaying
   c. Binary disk overlaying

9. Chart description may be saved on tape or disk.

10. Fully compatible in approach and data format with Timeseries II.

Program 3

Title: **GRAFUS**
Author: GCS Group
Tektronix, Inc.
Amstelveen, Holland
Memory Requirement: 16K
Level 5 Firmware
Peripherals: 4907 File Manager
or
4051R05 Binary ROM
Optional-4662 Plotter
Statements: 2180

Files: 21 Program

The software package provides the user with a set of three graphing routines with selectable options which can be inserted into his/her application program.

GRAPH for drawing a curve through **user-defined** data pairs.

POLAR for drawing a curve defined by magnitudes and angles.

CURVE for drawing a curve defined by coefficients and exponents.

The selectable options include:

Autoscaling
Lin-lin, semi-log, log-log axis systems
Curve smoothing
Multiple curve plots (4 maximum)
Line types (solid, dot, dash, dot-dash)
Graphic device address
Symbol plotting (every nth point)
Axis generation (main or supplementary for Polar)
Check (parameters and compatibility)
X and Y axis labels (4 characters)
Title (72 characters)
Viewport coordinates (set or default)
Positive X and Y values (50 maximum)

A tutorial provides the user with the required data structures. Demos clarify the routines.

GRAFUS can be easily combined with user programs using the APPEND command.

GRAFUS is equipped with a data-checking and error-message routine.

Program 4

Title: **3-D Data Plot**

Author: Michael Poe
Tektronix, Inc.
Wilsonville, OR

Memory Requirement: 32K

Statements: 509

Files: 1 Program

This program graphically plots on the screen of the TEKTRONIX 4050 the contents of any M x N matrix. This matrix is entered and can be corrected with the program. There are 6 different methods of data presentation, two of which are in three dimensional perspective.

1. 3-D Histogram
2. 3-D Point Plot
3. Ranged Cell Graph
4. Signed Cell Graph
5. Bar Histogram
6. Point Plot

A default viewpoint is calculated for each 3-D plot, but the user may rotate the plot or change the perspective.

A comparison of two rows of columns of data or a selection of part of an array may also be selected for plotting.
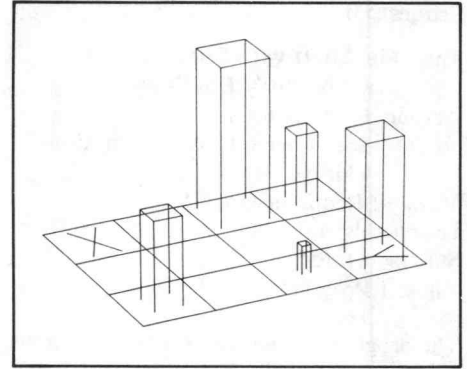
Program 5

Title: **Negative/Positive Bargraph**

Author: Isaac C. Arthur, Jr.
U.S. Dept. of HUD
Washington, D.C.

Memory Requirement: 32K

Peripherals: 4907 File Manager
4662 Plotter
4051R05 Binary ROM

Statements: 1143

Files: 6 Program
Requires data files

Bars with negative and positive values may be displayed on one graph. Graph parameters and data are prompted for from keyboard or may be input from tape or disc.

Maximum of 3 title lines; maximum of 24 characters per line
Maximum of 5 subtitles; maximum of 24 characters per subtitle
Maximum of 20 bars with negative, positive or 0 value; any number of bars may be grouped under a subtitle
Each bar may have a label of up to 24 characters
Negative bars are shaded
X-axis may be drawn at TOP or BOTTOM; maximum range of –100 to +100

14 User-Definable Keys manipulate data:

Save Plot (tape or disk)
Display Data (graph parameters and data in 4050 memory displayed on screen)
One Color Plot (plotted on 4662 in one color)
Multi-Color Plot (plotted on 4662; user prompted for pen changes)
Title Change
Subtitle Change
Bar Data Change
Add Bars

Delete Bars
Add Group (subtitle and bars added)
Delete Group
X-Axis Change
End
Restart

A main program calls overlays from the 4907 File Manager.

Program 6

Title: **Pie Chart with Shading and Transparency Routines**

Author: Fred Fachet
Social Security Administration
Chicago, IL

Memory Requirement: 32K

Peripherals: 4662 Plotter

Statements: 655

Files: 1 Program

The program allows the user to create a pie chart, and optionally, alter data values, main title, subtitle and segment or slice labels. The pie is previewed on the 4050 screen, and can be plotted on the 4662 Plotter. In the Plotter mode, the user has the option of changing pen colors for the title (main and sub), one or more segments of the pie, and the border.

The user may also elect to offset one or more segments of the pie. For additional emphasis, apart from color options on the 4662 Plotter, the user may also use the shading routine to outline the segment and have it shaded.

The transparency routines allow the user to annotate the chart with standard horizontal or vertical text. The user may also select different character fonts to label the pie chart with non-standard characters for foreign languages or currencies.

The shade and transparency routines may be used independently to highlight and/or annotate, make geometric figures, produce text, overhead transparencies, report cover sheets and so on.

User-Definable Keys Provide:

Pie Chart
Change Data
Screen
Plotter
Shade
Transparency
Fonts
Menu/Restart


```
[ < ] > # $ \ | @          FONT 0

A a A a # $ Ô ô @          FONT 1

A a Ü Ü £ $ Ô ô @          FONT 2

[ < ] > £ $ \ | @          FONT 3

¡ < ¿ > # $ | Ñ | @        FONT 4

[ ← ] → # $ \ κ §          FONT 5

SELECT FONT NUMBER FOR PLOTTER
DEFAULT IS 0 -- JUST PRESS RETURN:
```



```
             *** MENU ***

LEFT JUSTIFY TEXT = T
RIGHT JUSTIFY TEXT = R
USER POSITION TEXT = P
VERTICAL TEXT = V
ARROW = A
OVAL = O
CIRCLE = C
LINE = L
BOX = B
DIAMOND = D
REPEAT LAST FIGURE = I

SELECT FUNCTION:
```
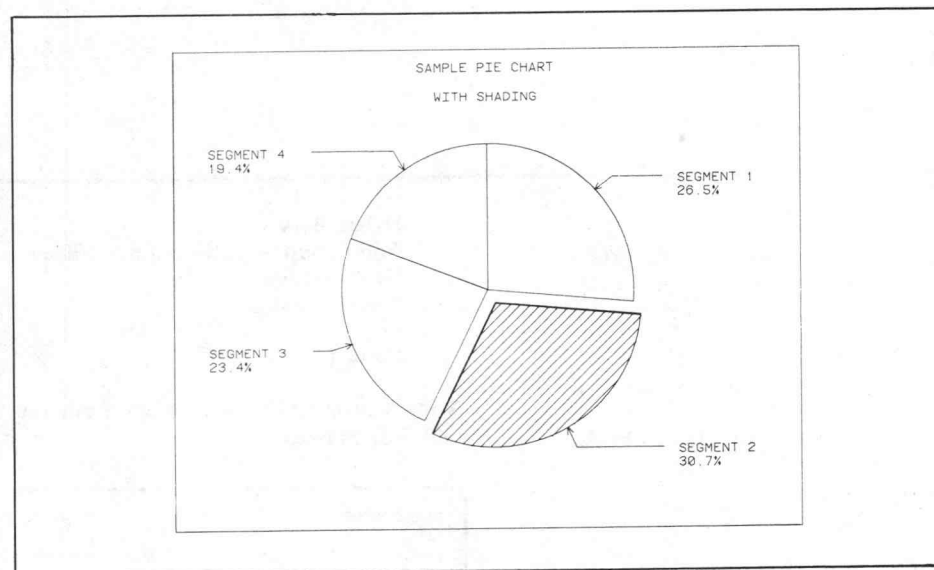

SAMPLE PIE CHART WITH SHADING

User Prompted Input:

Title
Sub-title
Number of segments
Labels (12 characters maximum)
Data values

The shading program was modified from TEKniques Vol. 3, No. 1 Programming Tip. Special thanks go to Nathan Oxhandler (Tektronix, Inc., Santa Clara Field Office) for his conception of the exploding pie chart technique.

Program 7

Title: **Pie Chart for Hard Copy**

Author: Dr. P.C. Holman
University of Wisconsin
Stevens Point, WI

Memory Requirement: 16K

Statements: 302

Files: 1 Program

Data to be presented as a pie chart is entered on the 4050 keyboard. The data is then presented as a table of original data, percent conversions, and degrees of a circle conversions.

The pie chart may be re-drawn larger, smaller, or the original size in any of 7 screen locations. Once the hard copy is made, text may be manually typed on it.

The program is tutorial.
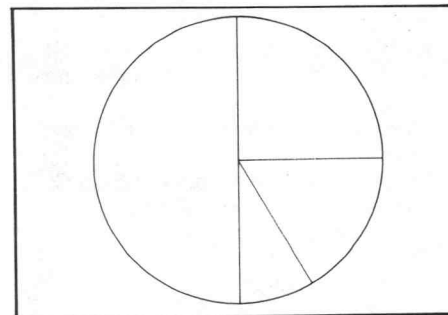
GRAPHING D2
062-5968-01

GRAPHING D2 is a disk collection of graphing programs from which you may create a variety of graphs, including line, bar, 3-D, pie, spider web. It also inculdes a routine to convert PLOT 10 graphics to 4050 GDU's. Various degrees of data manipulation are available. The individual abstracts describe each program.

Use these programs to generate presentation quality graphs for overheads or reports.

Title/
Previous Abstract #

Bargraph III
51/07-0910/0

Timeseries II
51/07-0906/1

Calendar Plot
51/00-0901/0

3-D with Perspective
51/00-9507/0

Enhanced Pie Chart
51/07-9539/0

Spider Web Charts
51/00-9521/0

Plot 10 to GDU Graphic Data Converter
51/00-9542/0

Program 1

Title: **Bargraph III**
Author: Mallory M. Green
       Dept. of HUD
       Washington, D.C.
Memory Requirement: 32K
Peripherals: 4662/4663 Plotter
         Optional-4907 File Manager
Statements: 4572
Files: 10 Program

Bargraph III is an easy-to-use interactive bar chart program. The user defines a bar graph by responding to Bargraph III prompts.

A group of bars consists of one or more bars with different shading patterns. The bars may be horizontal or vertical; and they may be stacked, overlayed or comparative.

Maximum parameters:

12 groups of bars
4 bar types
3 title lines
72 characters per title line
30 characters per data set legend
20 characters per group label
3 extra text strings
72 characters per extra text string

Parameters may be adjusted within memory limits, by decreasing some and increasing others.

All titles, labels and text are drawn at user-specified scales. Various lines modes and data symbols are user selectable.

Chart modification, including adding/deleting bars or groups of bars, can be done easily through the User-Definable Keys.

Chart descriptions can be saved to tape or disk.

Output to the plotter in one color or multiple colors. Plot may be rotated 90 degrees. Tabular and graphic display also on the screen.

Program 2

Title: **Timeseries II**
Author: Mallory M. Green
        U.S. Dept. of H.U.D.
        Washington, D.C.
Memory Requirement: 32K
Peripherals: 4952 Joystick or
           4662 Plotter
           Optional-4907 File Manager

Statements: 1199

Files: 3 Program
      Requires data files for storage on
      same tape/disk

A program designed to generate professional timeseries charts in a simple interactive manner.

The program has the following features:

1. An easy to use prompted chart definition mode; easy modification of charts via the User-Definable keys.

2. Can draw up to 6 lines for up to 35 time periods. 4 line types available; 1 symbol type. Lines may be deleted or added.

3. Time periods such as seconds, minutes, hours, days, weeks, months or years can be used. Time periods may be added to or deleted from either end of the X-axis.

4. Prompted keyboard entry of 3 graph title lines, X-axis & Y-axis labels, line labels, and data. All may be edited; line labels may be repositioned.

5. Y-axis scale may be specified.

6. Horizontal or vertical grid optional.

7. Missing value indicator.

8. The following output methods:

   a. Tabular display on screen
   b. Drawn on screen
   c. Plotted on plotter in one color
   d. Plotted on plotter in multiple colors

9. Three program overlay modes:

   a. ASCII tape overlaying
   b. Binary tape overlaying
   c. **Binary disk overlaying**

10. Chart description may be saved on tape or disk.

11. Fully compatible in approach and data format with Bargraph II.

Program 3

Title: **Calendar Plot**
Author: Aaron Eisenbach
        Tektronix, Inc.
        Baltimore, MD
Memory Requirement: 32K
Peripherals: Optional-4662 Plotter

Statements: 1079

Files: 1 Program

CALENDAR PLOT is an interactive program which quickly allows you to produce **single or multiple curve plot graphs on a scale of Data vs. Months axes.**

It is sometimes difficult to analyze data from different periods of time, which are plotted on the same chart. With this program you can select the least confusing graph. It is useful for comparing sales, financial, or other business data.

The program includes two major categories.

1. Graphs of data for months within a calendar year period.
   a. Graph of one period
   b. Comparison of two periods
   c. Comparison of three periods

2. Graph of data for months which start in one year and end in the following year.
   a. Graph for one period
   b. Comparison graph for two periods
   c. Comparison graph for three periods

For graphs comparing 2 or 3 periods, data begins in the same month for each period but may end at different months (12 month maximum).

A plot includes one or more of the following plot formats:

1. Line
2. Dashed Line
3. Bar
4. Shaded Bar

Each choice of graph requires new data input. No provision is made to store data.

Program 4

Title: **3-D With Perspective**
Author: Will Gallant
        Tektronix, Inc.
        Wilsonville, OR
Memory Requirement: 16K
Peripherals: Optional-4662 Plotter
Statements: 381
Files: 1 Program

The program accepts up to 500 points in space defined by X, Y, Z coordinates and a table defining their interconnection (program operation via the User-Definable Keys). A viewpoint in space and nose to screen distance is also requested. Data may be input from tape files or the keyboard and stored in a pre-marked file. No hidden line elimination is attempted. A training example is built-in. The 3-D algorithm was suggested in Principles of Interactive Computer Graphics by Newman and Sproull; McGraw-Hill publishers.
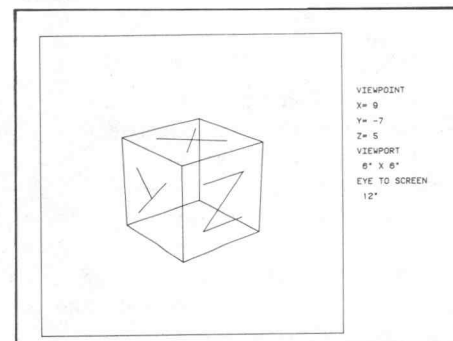
Program 5

Title: **Enhanced Pie Chart**
Author: Isaac C. Arthur, Jr.
       U.S. Dept. of HUD
       Washington, D.C.
Memory Requirement: 32K
Peripherals: 4907 File Manager
          4952 Joystick for screen display
          or 4662 Plotter
Statements: 1249
Files: 7 Program
     Requires data files

This program draws a pie chart on either a 4050 Screen or 4662 Plotter. Data for the chart may be entered directly through the keyboard, read from tape or read from disk.

    Maximum of 3 title lines; maximum of 64 characters per title line
    Maximum of 10 segments
    Maximum of 25 characters per segment label

Segment values may be those entered by the user or computed as percentages of the total
Segment separation options:
    All separated
    One separated
    None separated
User positions segment labels and values
Segment labels and values may be inside, outside or not displayed
Segments drawn on the Plotter may be multi-colored
10 User-Definable Keys manipulate the data:
    Save Plot (tape or disk)
    Display Data (titles, segment text and values)
    One Color Plot (4662)
    Multi-Color Plot (4662)
    Screen Plot
    Title Change
    Segment Text and Value Change
    Add Segments
    Delete Segments
    Chart Border (draws page borders)
    End
    Restart

A main program calls overlays from the 4907 File Manager.
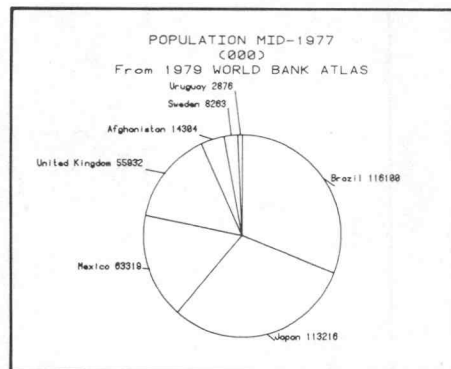
Program 6

Title: **Spider Web Charts**
Author: Tom Price
      Lorillard Research
      Greensboro, NC
Memory Requirement: 8K
Statements: 79
Files: 1 Program

This program produces spider web profiles for any number of parameters. Such profiles are useful in the concise presentation of multiple properties related to an item on a single graph. Rapid comparisons between items are greatly facilitated. This type of presentation is widely used in the tobacco industry for the comparison of flavor properties between different brands.

The number of properties, scale on which they are rated and graph titles are contained in data statements and are easily modified.

Graph title and property values are input.
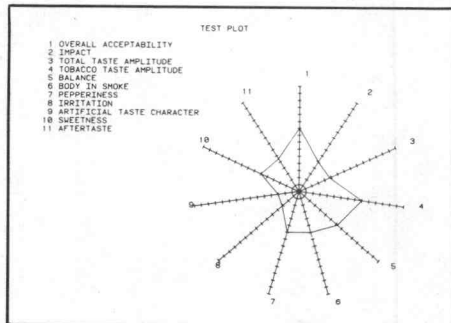
Program 7

Title: **PLOT 10 to GDU Graphic Data Converter**
Author: Paul J. Kristof
      Steve Duncan
      Tektronix, Inc.
      Wilsonville, OR
Memory Requirements: 16K
Peripherals: 4924 Tape Drive or
          4907 File Manager
Statements: 248
Files: 1 ASCII Program
      Requires pre-MARKed data file if using 4924

The program takes graphic character data (PLOT 10) from a 128 or 256 byte recorded data cartridge, converts it to Tek GDUs (graphic display units), and stores it on an auxiliary tape drive or the 4907 disk unit. This allows plots created on other computer systems to be displayed on the 4050 Series using the MOVE and DRAW commands.

The data can be picked from any file on a 256 byte tape or a 128 byte tape. Data is formatted as follows: if the X value is negative, the data pair is a MOVE. All other values indicated a DRAW command. A sample program is included which will display the plots after they have been converted.

The program compensates for XLOY, so extended addressing data may be converted. However, optimized graphics (see the 4014 manual) cannot be converted using this program.

Alphanumeric data is printed to the 4050 screen during the conversion process, but won't be saved.

INTERFACING T1
062-5984-01

Twenty-two programs provide a variety of interfacing aids from general applications to specific. The individual abstracts describe each program.

Five of the programs must be transferred to their own dedicated tapes. The documentation for each gives specific instructions for accomplishing the transfers.

Title/
Previous Abstract #

Data Communications Utility
51/00-6122/0

MC6800 Disassembler
51/00-6110/0

Camer Triggering Circuit
51/00-6115/0

GPIB Frequency Response Measurement
51/00-8024/0

Paper Tape Labeler
51/00-8017/0

A/D Sampling and Modification
51/00-6116/0

CYBER 175 Terminal Control
51/00-6123/0

UNIVAC 1108 Terminal Control
51/00-6123/0

PDP 11/40 Interface to the 4050 Graphic System
51/00-6106/0

4050/468 Utility
51/00-6125/0

20mA Current Loop Interface
51/00-6118/0

LORAN-C Receiver Interface to 4050
51/00-5902/0

Format Tape To Load Motorola 6800 Microprocessor Under MINIBUG Control
51/00-8013/0

4050/QUANTEX DS-12 Interface
51/00-6111/0

GPIB GET Command Trigger
51/00-8030/0

Tektronix/Hewlett Packard 488 Interface
51/00-6117/0

Hardware Modification of Hewlett Packard 59306A Relay Actuator for Use with the Tektronix 4051
51/00-6101/0

Hewlett-Packard Interface Package
51/00-6102/0

HP/Tektronix/Amdahl Interface
51/00-6120/0

4050-ARGUS Display Subsystem Interface
51/00-6119/0

Controlling FFT Operations from Tape
51/00-6113/0

4050/492P Utility
51/00-6124/0

Program 1

Title: **Data Communications Utility**
Author: Chris Rotvik
Tektronix, Inc.
Irvine, CA
Memory Requirement: 8K
Peripherals: Opt 1 (RS-232)
Statements: 135
Files: 1 ASCII Program

The program provides a means by which to transfer data files (or programs) between 4050 Series Desktop Computers utilizing telephone lines and the optional Data Communications Interface (Opt 1).

Features Include:

1. Input and output files may be ASCII or binary.

2. Interactive program allows operator selection of:
   A. Baud rate
   B. Transmit or receive
   C. Input or output file number
   D. Output file format (ASCII or binary) if file format is not currently defined

3. Software communication protocol.

4. Transmission error detection.

Program 2

Title: **MC6800 Disassembler**
Authors: Ed Sawicki
Joe Boim
Tektronix, Inc.
Long Island, NY
Memory Requirement: 8K
Peripherals: Optional-4641 Printer
4051R06 Editor ROM Pack
or
4052R06 Editor ROM Pack
Statements: 153
Files: 1 ASCII Program
1 ASCII Data (example)

The program produces a source code-like listing from HEX/ASCII object code. The object code must reside on a 4050 tape file. The source code listing can be directed to the 4050 screen or internal tape unit, a 4641 Printer or a GPIB device.

The object code must be in HEX/ASCII. Only the hexadecimal characters 0 through 9 and A through F are allowed. The object file must contain only the HEX/ASCII representation of machine-executable code.

The source listing is divided into five fields:

1. The byte count in decimal
2. The value of the program counter in HEX.
3. The op-code and operand in HEX/ASCII.
4. The mnemonic.
5. The operand.

The 4051R06 or 4052R06 Editor ROM Pack may be used to insert comments into the listing, change absolute addresses and operands to labels and symbols and to insert equate statements.

Program 3

Title: **Camera Triggering Circuit**
Authors: Steven Fahnenstiel
William Retallack
NOAA
Boulder, CO
Memory Requirement: Determined by user
program
Peripherals: User-built Interface
16mm Camera
Statements: 14
Documentation Only

Animation has allowed us to show motions of particle populations in the earth's magnetosphere as a function of time, and provided a way to correlate data from two nearby satellites into a two-dimensional picture of boundary motion.

A surplus 16mm single-frame camera with a 25mm Angenieux lens is used for filming. The camera has a solenoid-operated guillotine shutter in which shutter speeds are determined by the duration of the applied current. The specially designed interface uses the signal lines off the GPIB. In 16mm format, plus-x reversal film at ASA 50 allows resolution limited only by that of the graphic system.

The camera is tripod mounted and roughly centered before the screen. Using a PRINT @32,21:65,50 statement, a reference point is drawn at the screen's center. Fine adjustment is done using a jig consisting of a square rod with two orthogonal vanes at its end. The camera is then positioned so that the vanes lie flush against the screen surface, with the rod aligned along the camera axis and centered on the screen. Camera-to-screen distance is 22 inches using f5.6 with a shutter speed of 1.5 sec.

A subroutine triggers the shutter one or more times in succession, followed by eight PAGE commands to reinitialize the automatic origin position.

Documentation includes interface schematics.
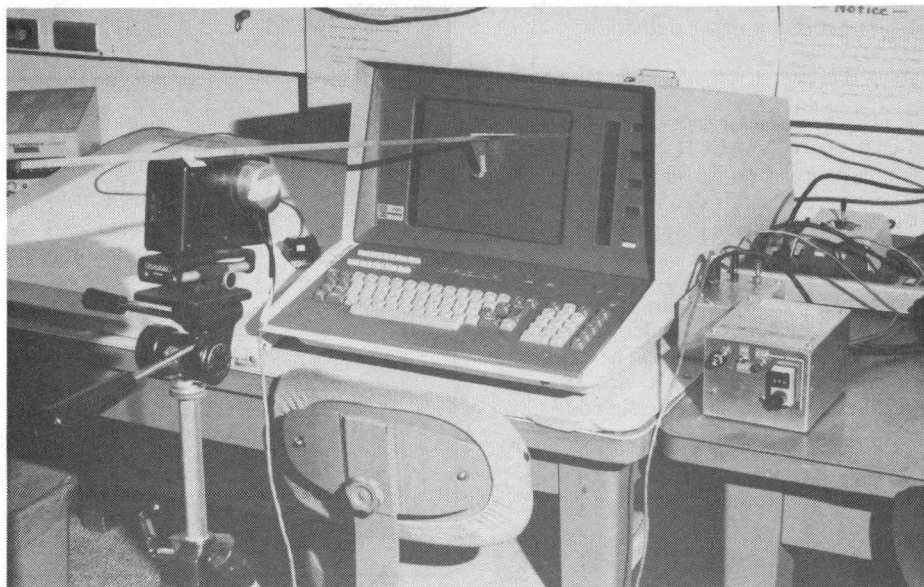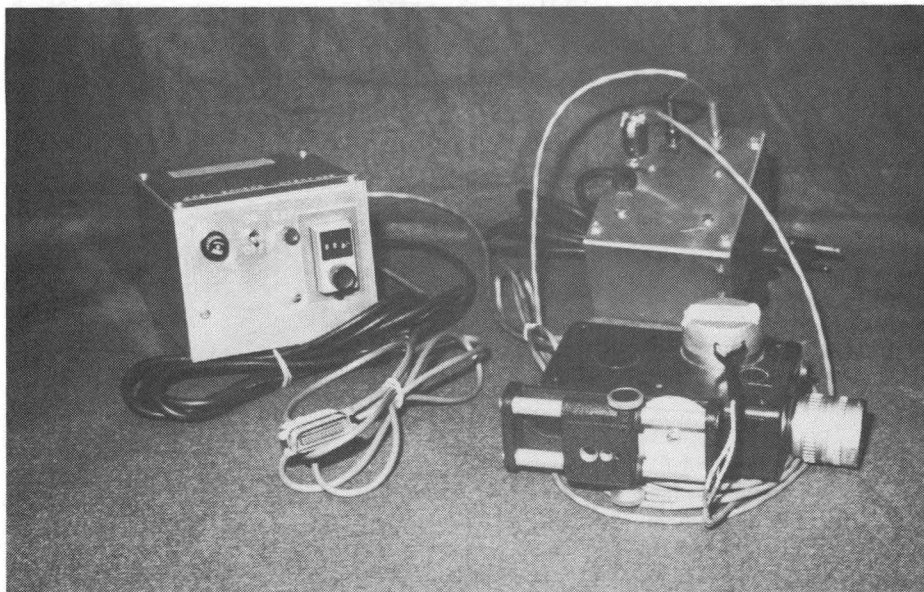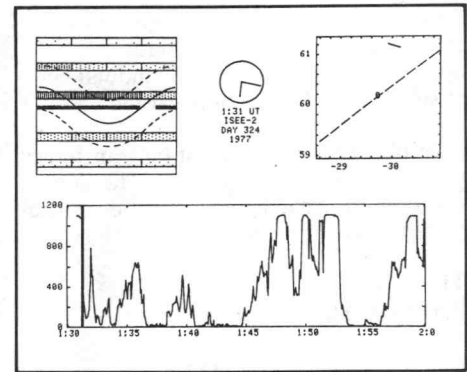
Program 4

Title: **GPIB Frequency Response Measurement**

Author: Phil Somerset
Tektronix, Inc.
Rockville, MD

Memory Requirement: 8K
Peripherals: Optional-4662 Plotter
Statements: 240
Files: 1 ASCII Program

This program uses a Fluke 6011A Synthesized Signal Generator and a Fluke 8502A Digital Multimeter to measure the frequency response of any device working in the range 10 Hz to 1 MHz. The device under test may be a passive device, such as a resistor, inductor, filter, transformer, etc., or it may be a voltage or power amplifier. Input of test parameters is interactive and the results are graphed on a logarithmic scale and documented with user-supplied data. The output graph may be directed to the 4662 Plotter.

User-supplied data:

Device type
Frequency range (default is 20 Hz to 20 kHz)
Name of device under test (graph title)
Additional text (up to 3 lines to appear in lower left corner)

User-Definable Keys allow user to:

Perform test
Change set-up
Redraw graph
Plot graph
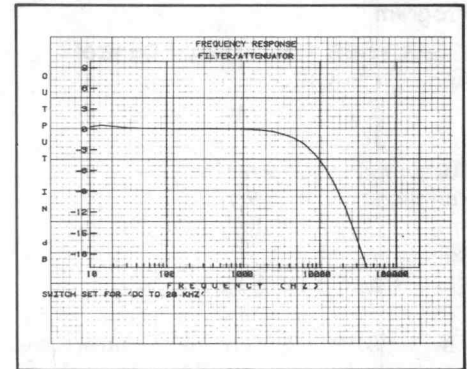
Program 5

Title: **Paper Tape Labeler**

Author: G.L. Evans
Herne Hill, London, England

Memory Requirement: 8K
Peripherals: Paper Tape Punch
Statements: 95
Files: 1 ASCII Program

When the 4050 is used to drive a paper tape punch, this program allows a visual header to be punched in the beginning of a paper tape for easy identification.

A leader of 50 nulls is first punched, and a header of 72 characters maximum is entered into the 4050 via the keyboard. All of the usual editing facilities of the 4050 may be used at this time. The header is then coded in a standard 5 x 7 matrix and punched, followed by a trailer of 50 nulls.

An example of one type of system used in this mode is the punch on an ASR teletype connected to the 4050 via the IEEE bus (GPIB). The conversion between the IEEE standard and the teletype logic is done using a microprocessor programmed to allow the teletype to be used in the commands SAVE @1: and PRINT @1: so that data can be sent after the header.
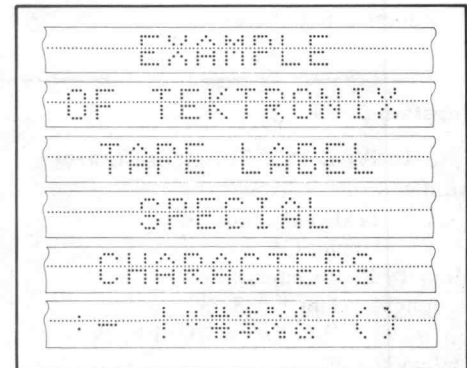
Program 6

Title: **A/D Sampling and Modification**

Author: Barry T. Bates
Dept. of Physical Education
University of Oregon
Eugene, OR

Memory Requirement: 24K, 32K best
Peripherals: 40501R05 Binary ROM Pack
TransEra 652-ADC A/D Converter ROM Pack

Statements: 401
Files: 1 ASCII Program

Sixteen data channels can be monitored over three different voltage ranges of ±10, 2.4 and 0.3 volts with resolutions of 5, 1.2 and .16 mV. Single channel sampling rates of 38,819 and 23,496 samples/sec are possible with 8-bit and 12-bit mode respectively. Multi-channel sampling rates are limited to 9000 samples/sec.

The ROM Pack A/D provides 12 routines for operating, manipulating and displaying the data. In addition to controlling the ROM Pack routines through the User-Definable Keys, the control program provides an additional five functions.

Initialize program

Bit resolution
Voltage range
Number of channels
Sampling order
Sampling rate
Sample total

Sampling

Keyboard
Automatic triggering
Designate channel
Input voltage
Pre-trigger values

Unpack data (string to array—floating point)
Unpack 2 data (string to array—raw voltages)
Pack data (array to string)
Modify/scale data
Graph data
Print data
Summarize/change parameters
Data to tape
Data from tape
Delete data points

Program 7

Title: **CYBER 175 Terminal Control**
Author: Chris Rotvik
Tektronix, Inc.
Irvine, CA
Memory Requirement: 8K
Peripherals: Opt 1 (RS-232)
R06 Editor ROM Pack
Statements: 63
Files: 1 ASCII Program

The CYBER 175 Terminal Control program sets the proper optional Data Communications Interface (Opt 1) parameters and modes to interface a 4050 Series Desktop Computer to the CYBER 175 host computer.

Features are:

1. Function key driven

2. Provides the following modes of operation:

A. Terminal mode

B. Data receive mode (from the system editor)

C. Data send mode (to the system editor)

D. Editor mode (utilizing the R06 Editor ROM Pack)

3. Designed around the need to perform editing offline from the host computer

---

Program 8

Title: **UNIVAC 1108 Terminal Control**
Author: Chris Rotvik
Tektronix, Inc.
Irvine, CA
Memory Requirement: 8K
Peripherals: Opt 1 (RS-232)
R06 Editor ROM Pack
Statements: 63
Files: 1 ASCII Program

The UNIVAC 1108 Terminal Control program sets the proper optional Data Communications Interface (Opt 1) parameters and modes to interface a 4050 Series Desktop Computer to the UNIVAC 1108 host computer.

Features are:

1. Function key driven

2. Provides the following modes of operation:

A. Terminal mode

B. Data receive mode (from the system editor)

C. Data send mode (to the system editor)

D. Editor mode (utilizing the R06 Editor ROM Pack)

3. Designed around the need to perform editing offline from the host computer

---

Program 9

Title: **PDP 11/40 Interface to the 4050 Graphic System**
Author: Joan M. McDonald
Department of Defense
Ft. Meade, MD
Memory Requirement: 8K
Peripherals: Option 1 Data Communications Interface
PDP 11/40
Statements: 62
Files: 1 ASCII Program

This program provides an interface between the TEKTRONIX 4050 Graphic System and a PDP 11/40 computer which uses the RSX 11M system.

Three options are available:

Option 1:

1. "T" puts the TEKTRONIX 4050 System into Terminal mode as a terminal on the PDP 11/40.

2. "S" sends a tape file to the PDP 11/40.

3. "R" receives a tape file from the PDP 11/40.

Option 2 is used with the TSX 11M EDIT utility program.

Option 3 is used with PIP utility program.

Program 10

Title: 4050/468 Utility

Author: Craig Bulmer
   Tektronix, Inc.
   Chicago, IL

Memory Requirement: 32K
Peripherals: Tektronix 468-Oscilloscope
   Optional 4662/3 Plotter
Statements: 463
Files: 1 ASCII Program
   Requires dedicated data tape

This program will take waveforms from the 468 Oscilloscope and display the waveforms on the 4050 screen; with printed header information of Channel 1, 2 and/or Add; Volts/Div; Time/Div; Trigger Point; Max Volts; and Min Volts. Waveforms can be saved to tape and redisplayed from tape. Output to either screen or plotter with reference scope grid. Waveforms displayed from tape are displayed as dots.

	CHANNEL_1 ACQUIRED	CHANNEL_2 ACQUIRED
COUPLING	DC	DC
TIME/DIV	200.00 US	200.00 US
VOLTS/DIV	1.00 V	5.00 MV
TRIGGER PT.	1.79 MS	1.79 MS
MAX VOLTS	4.880 V	30.800 MV
MIN VOLTS	3.960 V	28.200 MV
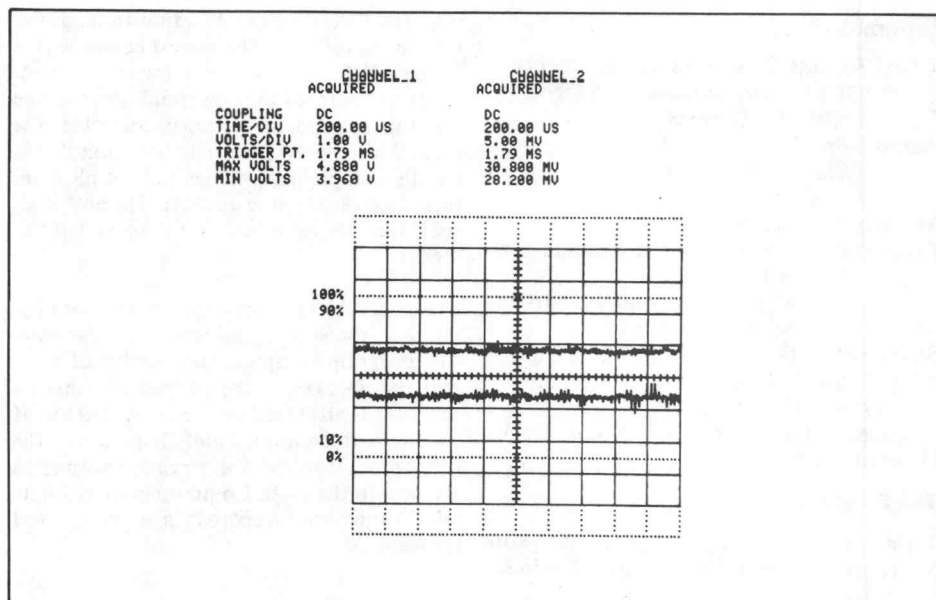
Program 11

Title: 20 mA Current Loop Interface

Authors: William M. Retallack
   John H. Taylor
   NOAA
   Boulder, CO

Memory Requirement: 8K
Peripherals: Model 33 Teletype
Statements: 52
Files: 1 ASCII Program

One of the many different tasks we have in data reduction is digitizing analog data and outputting long lists of X and Y values. To save on the cost of hard copy paper, a special interface was constructed. The analog data is digitized, scaled and the output is listed on a Model 33 Teletype. It has been in use for over three years and hasn't dropped a bit yet.

The interface connects through the RS-232 plug. Complete schematics are included in the documentation along with a short digitizer and output program.
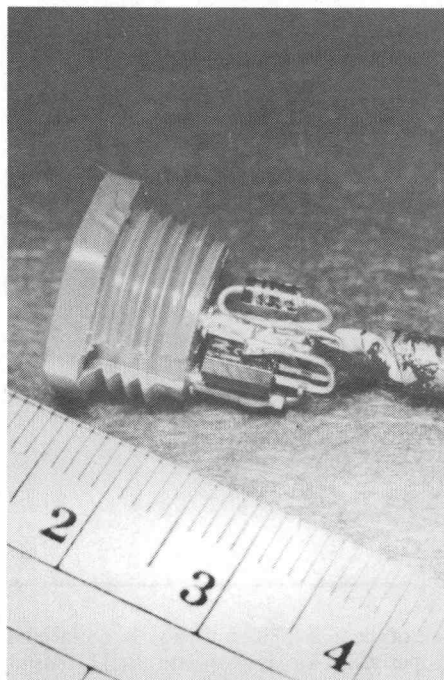
Program 12

Title: LORAN-C Receiver Interface to 4050

Author: Peter G. Mauro
   Dept. of Transportation
   Cambridge, MA

Memory Requirement: 8K
Peripherals: Northstar LORAN-C Model 6000 Receiver
   Northstar Interface Adaptor 6700
   Option 1 Data Communications Interface
Statements: 94
Files: 1 ASCII Program
   Requires pre-marked data files

The program accepts serial information from a LORAN-C receiver and stores it on tape. It will plot the latitude and longitude position of the LORAN-C receiver on the 4050 Screen as both are driven along a roadway. It will plot directly from the receiver or from the data stored on tape.

It doesn't plot the latitude and longitude position directly but takes a running average of five consecutive readings to smooth out the plotted curve.

Areas of application include emergency vehicle dispatch and fishing craft path plotting.

LATITUDE IS THE VERTICAL AXIS   LONGITUDE IS THE HORIZONTAL AXIS
SCALE IS 0.02 NAUT. MILES PER TIC INTERVAL
ORIGIN IS 42 24.75N 71 06.14W

Program 13

Title: **Format Tape To Load Motorola 6800 Microprocessor Under MINIBUG Control**
Author: Fred L. Royer, Ph.D.
Cleveland V.A. Hospital
Brecksville, OH
Memory Requirement: 8K bytes
Peripherals: Option 1 Data Communications Interface
Motorola M6800/MINIBUG Microprocessor
Statements: 114
Files: 1 ASCII Program
1 ASCII Data
Requires at least 1 pre-marked data file on Program tape

The Program

This program loads the M6800 Microprocessor with MINIBUG. To do so requires that a record be input in a special format, as follows. The record begins with a header "S1", followed by the number of bytes (a pair of hexadecimal digits), the starting address in memory, and then the data. The data ends with a checksum that is the 1's complement of the sum of all data, including the starting address. The end of all such records is indicated by an added tail "S9".

The program requires entering the data file number, the starting address, and the data. The program computes the number of bytes and the checksum; the properly formatted record is then stored on the requested file. If the file is to be immediately loaded into the microprocessor, the appropriate parameters are sent to the Data Communications Interface, and the records are read and transmitted.

The program is limited to a maximum of 128 bytes of two hexadecimal digits per file. (These are 1 header byte, 1 byte count, two starting address, 122 data, 1 checksum and 1 tail.)

Data Tape Structure

The data is stored in an ASCII file. Use of File 2 is mandatory; additional files are optional. The format is identical to the punched tape format for the Motorola M6800/MINIBUG microprocessor. An index is not required. The data file is located on the program tape; be sure data file(s) are previously marked.

Program 14

Title: **4050/QUANTEX DS-12 Interface**
Author: John Carter
Tektronix, Inc.
Santa Clara, CA
Memory Requirement: 32K
Peripherals: QUANTEX DS-12 Image Processor
Statements: 266
Files: 1 ASCII Program

The program provides an interface between the 4050 Series Graphic System and a QUANTEX DS-12 Image Processor. Use the 4050 System to control and modify the video frame captured by a QUANTEX DS-12 Image Processor.

The User-Definable Keys are used to perform the following functions:

— Retrieve one horizontal line
— Retrieve one vertical line
— Send one horizontal line
— Send one vertical line
— Plot one horizontal line
— Write a cross
— Store a field on tape
— Send a field from tape
— Restore X data
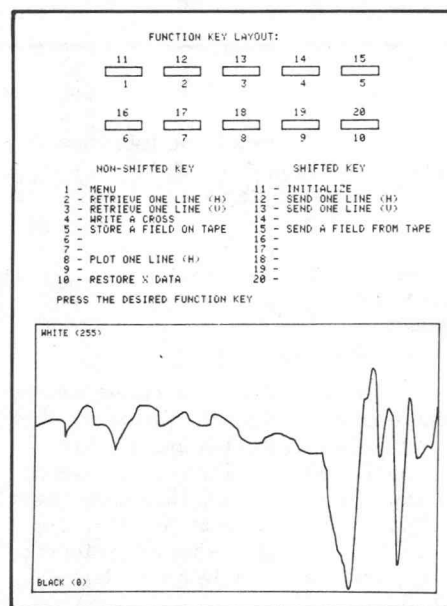
Program 15

Title: **GPIB GET Command Trigger**
Author: James R. Matey
RAC Laboratories
Princeton, NJ
Memory Requirement: 32K
Peripherals: One-HP 3438A multimeter or Two-ICS/Fairchild 4880 Bus Coupler
Statements: 158
Files: 2 ASCII Program

Two programs trigger devices on the GPIB of the 4050 Graphic System by means of the group execute trigger command (GET).

The first program is used with an HP 3438A, the second with two ICS 4880 Bus Couplers. The device(s) must be connected via the appropriate cables to the 4050, and in the case of the ICS 4880's must also be connected properly to an appropriate BCD output device. The details of the connections are presented in the manufacturers' instructions for these devices.

These programs are used to automate laboratory experiments allowing the 4050 to read the results of a measurement.

Program 16

Title: **Tektronix/Hewlett Packard 488 Interface**

Author: Robert Cope
Michael Bowman
Atlantic Analysis Corporation
Norfolk, VA

Memory Requirement: 8K
Peripherals: Hewlett Packard 9835 or 9845
Statements: 70
Files: 1 ASCII Program
1 ASCII Text

This program transfers messages input from the keyboard of an HP 9835 to a TEKTRONIX 4051 and vice versa. The purpose is to demonstrate the capability of the HP 9835 and TEKTRONIX 4051 to communicate using the standard IEEE-488 Interface Bus to demonstrate the interrupt capabilities and limitations of both computers. The configuration simulates an interconnection between a TEKTRONIX 4054 and a Hewlett-Packard 9845 which were not available at the time the evaluation was conducted.

Communications using the 488 bus will make it possible to off load the graphics processing load in ECLIPS tactical display systems to an intelligent graphics display which will free the other computer for message processing and textual information display. The interrupt capabilities of the machines will make it possible for each processor to devote full time to their respective tasks, being interrupted only to service operation requests or intercomputer communications needs on a time available basis ensuring that the high priority message processing is never neglected.

The complete evaluation is included as part of the documentation.

Program 17

Title: **Hardware Modification HP 59306A Relay Actuator**

Author: Tyler Coplen
U.S. Geological Survey
Reston, VA

Memory Requirement: 8K
Peripherals: Hewlett Packard 59306A
Relay Actuator
Statements: 37
Files: 1 ASCII Program

This program uses the 4051 as a controller to open and close each of six independent double-throw relays in the HP 59306A Relay Actuator. The control is through the User-Definable Keys. The HP operates on the HPIB (Hewlett Packard's implementation of the IEEE Standard 488-1975). With a minor modification of the HP 59306A hardware, it can be controlled with the 4051. The hardware modification consists of connecting REN (remote enable of the HP 59306A) to common. The modification is described in detail. The only drawback of this modification is that the HP 59306A must be powered off and on to exit from the Local Lockout (LLO) mode.

Program 18

Title: **Hewlett-Packard Interface Package**

Author: Peter O. McVay
Program Specialist
Norfolk Public Schools
Norfolk, VA

Memory Requirement: 16K
Peripherals: Option 1 Data Communications Interface
Statements: 481
Files: 13 ASCII Program
Requires dedicated tape

The menu provides operation control for the routine. The entire interface package allows you to:

1. Log on and off the HP2000 series computers,
2. Interface in terminal mode,
3. Restore and store HP programs on the 4051 tape system,
4. Store and restore HP files using HP utility programs $FCOPY and $EDITOR,
5. Connect the TEKTRONIX 4051 to any RS-232 EIA-compatible hardcopy terminal for listing or printing (terminal may be used as a line printer only).

The system is internally documented, and maintains continuous control of the two computers. Pressing Overlay Key 5 (RETURN TO BASIC) returns control to the MENU.

Program 19

Title: **HP/Tektronix/Amdahl Interface**

Author: Subarna M. Malakar
1305 South Main St.
Gainesville, FL

Memory Requirement: 8K
Peripherals: Option 1 Data Communications Interface
Hewlett Packard 99810A programmable calculator
Hewlett Packard 11205A Interface
Amdahl 470 V/6-II with OS/MVS Release 3.8 and JES2 NJE Release 3 at NERDC, U. of Fla.

Statements: 241
Files: 5 ASCII Program
1 ASCII Data (example)
Requires dedicated tape

The programs perform the following functions:

1. Directory
2. TCP-SIGN ON—Allows 4051 to operate as a terminal to the host computer at 1200 baud. It prompts the user to sign-on to the host computer on TCP mode, and to execute select TCP commands by returning to BASIC.
3. TCP to TEK—Allows a TCP file from the host computer to be sent to a tape file on the 4051.
4. TEK TAPE to TCP—Allows data on 4051 tape to be sent to TCP **workfile**.
5. HP to TEK TAPE—Allows data from HP 9810A system cassette files to be transferred and stored in 4051 tape files. External switching is required to change the interface to HP 9810A. Certain prompting control characters must be sent from HP 9810A through the PARAMETER LIST key for other conditions.
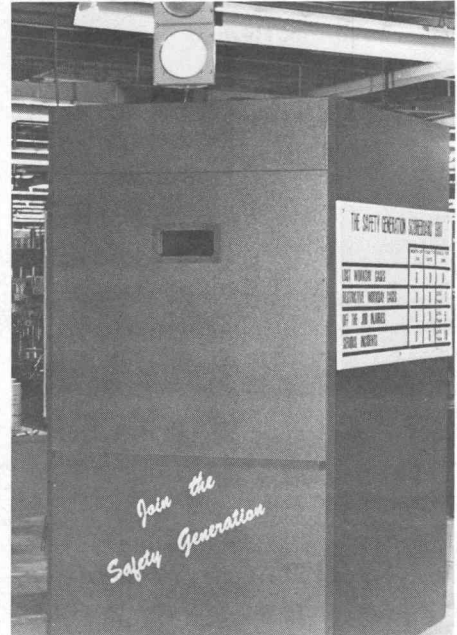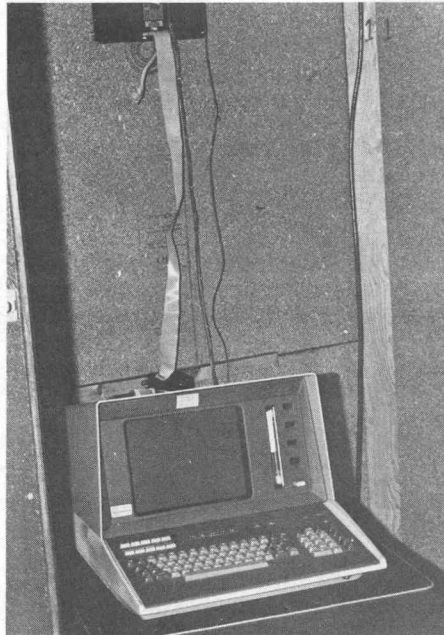
Program 20

Title: **4050 IEEE ARGUS Display Sub-System Interface**

Author: Chuck Paulsen
E.I. DuPont
Newton, CT

Memory Requirement: 8K

Peripherals: Option 1 Data Communications Interface
IEEE-ARGUS Alphanumeric Display Subsystem (Plasma Dot Matrix)

Statements: 316

Files: 5 ASCII Program
1 Binary Data (example)
Requires dedicated tape

We use the 4051 to drive our ARGUS display. The first program prompts for the "pages" of 8-line messages to display and the time delay between messages. It converts the messages into the special six-bit code required by the display device, and stores the messages and display time on tape.

A second program reads the information from the data file and outputs one page at a time to the display.

File 1 is a directory. Files 2 and 3 contain the programs which have no REMark statements in order to conserve on memory. Files 4 and 5 contain the programs documented with REMark statements.

Program 21

Title: **Controlling FFT Operations from Tape**

Authors: L.D. Mitchell
John H. Herold
Donatus C. Ohanehi
Mechanical Engineering Dept.
Virginia Polytech. Inst. & State Univ.
Blacksburg, VA

Memory Requirement: 8K

Peripherals: Zonic Technical Laboratories FFT System Model 5003
Option 1 Data Communications Interface

Statements: 147

Files: 2 ASCII Program
4 ASCII Data (examples)
Requires dedicated tape

These programs enable the user to automate FFT operations using the ZTL 5003 FFT machine. They also simulate the batch routine option available on ZTL's FFT.

Repetitive FFT operations may be controlled from tape. One program prompts the user to input FFT commands, delays to allow viewing, copying and transmitting of next commands and screen paging. These are stored in user-specified pre-marked data files.

A second program transmits FFT commands on tape to the FFT system, displays the commands and plots.

A third program loads FFT batch programs from 4050 tape into the FFT memory then allows interaction for editing or execution.

Theory, method and examples are all included in the documentation.

Program 22

Title: **4050/492P Utility**
Author: David B. Green
Tektronix, Inc.
Beaverton, OR
Memory Requirement: 32K
Peripherals: 492P Spectrum Analyzer
Optional-4662 Plotter
Statements: 1286
Files: 8 ASCII Program
9 ASCII Data
7 Binary Data
Requires dedicated tape

This is a demonstration software package, however, it contains many useful algorithms that can be adapted for personal application programs. The following are the sub-programs in this package.

Indexing/Menu

Contains the initial control structure for the entire package. Used to access desired sub-programs and also contains a complete list of 492P commands. This sub-program also allows direct control of the analyzer over the GPIB bus.

492P Waveform Transmission

Establishes a single keystroke approach which alows you to either transmit or receive waveform data. Instrument Front Panel Settings may also be transmitted or received along with each corresponding waveform. Provides for simple data storage to magnetic tape which will allow you to store measurement conditions and data. By the stroke of a few User-Definable Keys, the 492P can be made to reconfigure to previously made measurement parameters.

Spectrum Analysis

Provides rapid spectrum analysis from sweeps made on the 492P. Two types of analysis are provided:

1) This analysis lists and graphs the frequencies to either side of the signal at center screen. Sideband measurements are made easy with this portion of the program.

2) Direct frequency measurements are the function of this section. All signals appearing on screen are cataloged and listed on the controller.

492P Command Syntax Tutorial

This is a complete tutorial provided for the novice. The tutorial provides for the user comprehensive instruction in the use of the GPIB command syntax used in the 492P. As each item is presented, the user is allowed to "experiment" with each command with help as needed provided by the controller. Periodic review of this section keeps one's programming skills at a maximum.

Total Harmonic Distortion

This sub-program was provided especially for sales personnel. It operates using only the internal calibrator signal provided in the 492P. The program automatically searches for and measures all requested harmonics of a given frequency and computes the total Hermonic distortion. Measurement results are provided in a neat graphics format.

Utility Programs

Duplicate tapes. Name tape file headers to use for data storage.

MAPPING T1
062-5980-01

Two tapes contain 14 programs which cover a wide range of mapping applications. Included are programs that input, maintain and plot mapping data bases, produce contour maps, maps of the world and the U.S. map, generate records of hydrologic parameters, rotate reference globes and calculate polygonal areas, errors of closure for a unit traverse, plane areas, and relationships in specific disciplines. The individual abstracts describe each program.

Four of the programs must be transferred to other files or disks. The documentation for each contains specific instructions for accomplishing the transfers.

Title/
Previous Abstract #

Contour Plot
51/00-9511/0

Spherical Polygon Area On Earth
51/00-5901/0

Unit Traverse
51/00-1204/0

Azimuthal Equidistant Projection
51/00-9532/0

Watershed Measurement
51/00-1205/0

Manning's Equation Depth Flow
51/07-1202/0

PLANIMETER
51/0   !03/0

Solution and Plot of Mohr's Envelope
51/00-5301/0

LORAN-C Receiver Interface to 4050
51/00-5902/0

Sky Screen
51/00-9535/0

GAZINTAMAP
51/00-9540/0

4907 U.S. Map
51/07-9522/0

SCOPE
51/00-9529/0

Globe Rotation
51/00-5402/0

Program 1

Title: **Contour Plot**
Authors: Bob Kopitzke
         Dan Taylor
         Tektronix, Inc.
         Wilsonville, OR
Memory Requirement: 8K
Peripherals: Optional-4662 Plotter
Statements: 177
Files: 1 ASCII Program

This program produces a contour map from a rectangular array of "elevation" data points (random generated). Any number of contour levels may be chosen—it can plot one level at a time (to allow pen color changes) or many levels at once. There are no restrictions on the values of the levels. The program sequentially analyzes four data points (a cell) at a time. As each cell is processed all the contours which happen to pass through that cell are drawn before proceeding to the next cell. Therefore, the program is more suited to the 4050 screen than to the 4662 Plotter (although it will work with the plotter).

Program may be modified to accept user's data.

No provision to store data.
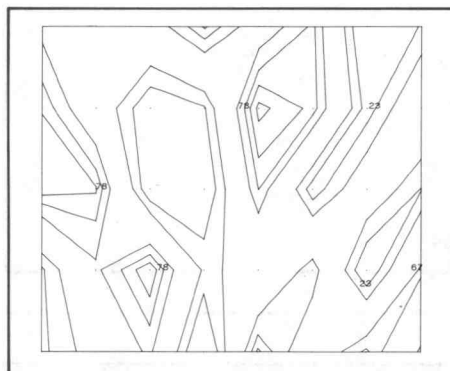
Program 2

Title: Spherical Polygon Area On Earth
Author: A. Jon Kimerling
        Oregon State University
        Corvallis, OR
Memory Requirement: 16K
Statements: 117
Files: 1 ASCII Program

The program calculates areas of spherical polygons in sq. km. (i.e., State of Oregon) from latitude/longitude values along their perimeter. Latitude/longitude values are consecutively entered from tape or the keyboard. If keyboard entry, user has chance to correct after each entry.

The coordinate method of area calculation used is based on adding or subtracting spherical triangles, with 90°N a common vertex for all triangles. Napier's Rules are employed to find values of angles in each spherical triangle, values that are used to compute spherical excess and then triangle area. These areas are then either added or subtracted from the cumulative area for the polygon depending on the difference in longitude between the two points which, with 90°N, form each spherical triangle.

```
SPHERICAL POLYGON AREA PROGRAM
ARE LAT./LONG. VALUES ENTERED FROM
TAPE CASETTE OR THE KEYBOARD? (T OR K)  K

ENTER LATITUDE AND LONGITUDE OF BOUNDING POINTS
USE -LAT FOR S.LAT., AND -LONG FOR W.LONG
CONVERT DEG.,MIN.,SEC. TO DECIMAL DEGREES
ENTER 999,999 WHEN THROUGH


ENTER PT. # 1  89,0
 89 0
CORRECT?(Y OR N) Y
ENTER PT. # 2  89,1
 89 1
CORRECT?(Y OR N) Y
ENTER PT. # 3  90,1
 90 1
CORRECT?(Y OR N) Y
ENTER PT. # 4  90,0
 90 0
CORRECT?(Y OR N) Y
ENTER PT. # 5  999,999
 999 999
CORRECT?(Y OR N) Y


TOTAL PTS. = 4

AREA = 107.413952105 SQ.KM.  .

CALCULATE ANOTHER AREA? (Y OR N) N

GOOD BYE
```

The State of Wyoming.

Program 3

Title: **Unit Traverse**
Author: U.S. Forest Service
        Six Rivers National Forest
        Eureka, CA
Memory Requirement: 32K
Peripherals: Optional-4662 Plotter
                   4641 Printer
Statements: 593
Files: 1 ASCII Program
     1 Binary data (example)
     Requires pre-marked data files

This program calculates the "error of closure" for a (single) unit traverse. Data may be entered from the keyboard, edited, listed and saved on tape for later use. Up to 250 data points may be entered. Coordinates may be computed and listed for either open or closed traverses. After the error of closure has been computed, it may be distributed around the traverse so any traverse can be closed. Ground measures may be in "feet" or "chains", vertical measures in "topo", "degrees", or "percent". The traverse may be plotted to the screen or a plotter. Corrected X-Y coordinates can be plotted on top of uncorrected coordinates to display gross errors.


```
SIX RIVERS NATIONAL FOREST - TEST DATA
COMPUTED AREA =      5.38 ACRES          ERROR IN CLOSURE: 1 IN 15
NOTE-THE TRAVERSE HAS BEEN CLOSED
```
```
100 FT TICS
```
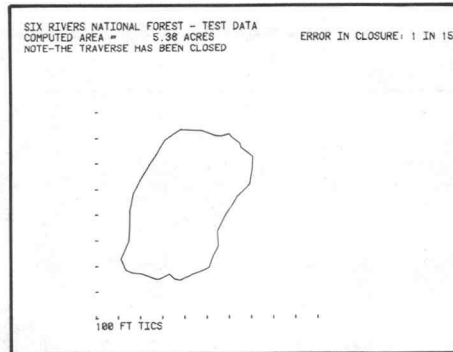


```
                          SIX RIVERS NATIONAL FOREST
                                 UNIT TRAVERSE
TRAVERSE IDENTIFICATION: TEST DATA
   POINT            X                      Y
     1             0.00                   0.00
     2           -72.87                 -48.03
     3          -118.43                 -94.92
     4          -167.52                -172.54
     5          -217.00                -248.01
     6          -233.06                -315.05
     7          -234.13                -382.00
     8          -238.90                -437.54
     9          -274.81                -504.82
    10          -251.43                -547.14
    11          -223.01                -558.69
    12          -181.35                -562.25
    13          -116.75                -582.43
    14           -98.09                -582.03
    15           -56.21                -564.46
    16           -31.45                -582.70
    17            -8.33                -586.52
    18            16.62                -577.38
    19            28.42                -573.45
    20            51.47                -563.16
    21            87.75                -552.26
    22           124.32                -536.62
    23           144.77                -488.82
    24           166.57                -455.70
    25           162.11                -397.47
    26           194.25                -341.35
    27           255.21                -259.43
    28           308.60                -212.96

PRESS ... `RETURN' ... TO CONTINUE !
```

Program 4

Title: **Azimuthal Equidistant Projection**
Author: W. Tobler
        University of California
        Santa Barbara, CA
Memory Requirement: 16K
Peripherals: Optional-4662 Plotter
Statements: 315
Files: 1 ASCII Program
     1 Binary Data

The program draws maps of the world centered at any origin. Great circle distances and azimuths to all places are correct from the map center. The image of the geographic graticule and/or the world coastal outlines (included on tape) can be plotted.

If the map is drawn on the plotter the program can also label additional locations on the map and prepare a small legend identifying the center of the map. The North and South poles are identified with N and S.
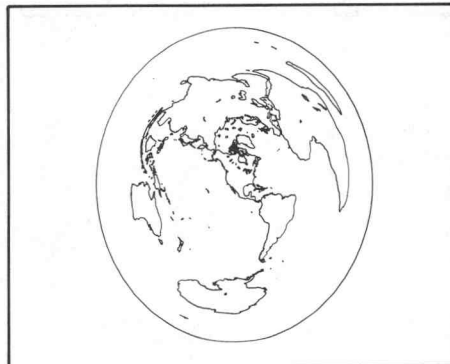
Program 5

Title: **Watershed Measurement**
Author: Gerald Zastera
        Nebraska Natural Resources Commission
        Lincoln, NE
Memory Requirement: 16K
Peripherals: 4956 Graphic Tablet
Statements: 442
Files: 1 ASCII Program
      Requires pre-marked data files

The program provides a record of hydrologic parameters that were previously measured by planimeters and distance wheels. They are: area, channel length, flood plain length, and time of concentration. These are usually taken from 7.5 minute quadrangle maps produced by the U.S. Geological Survey.

User inputs:

    map scale factor (converts tablet units, .005 inch, to feet and square miles)
    title
    operators name
    date
    time
    lower left and upper right corners of software keyboard

The first two columns of the software keyboard are the start and end of each of the measurements, with the third column consisting of the operator functions. These functions may be used at any time.

Set Window —enables the graphic display to be set to view a particular portion of the tablet; input lower left and upper right corners of the portion to view
Page —pages the screen
Comment —allows a line of text to be input onto the tape file; must be entered before each line of text is input
Good-Bye —will close the tape file and end the program

All measurements are taken twice to help prevent operator mistakes. Begin with "Watershed Start", entering the name of the watershed, then to area, flood plain, channel length, and time of concentration. The time of concentration may be divided into as many as five separate segments. Values may be remeasured, or saved to the tape file.

```
LOG ENTRIES FOR WATERSHED TEST
OPERATOR
DATE JUNE 1980      TIME
   WATERSHED REPORT FOR TEST DATA
NOTE ALL MEASUREMENTS ARE TAKEN TWICE FOR COMPARISON
AREA=            2.49            2.45 SQ. MI.
FLOOD PLAIN      5681            5654 FT.
TC TOTAL         0.14            0.15 HRS.
CHANNEL=         4954            4900 FT.

TC BREAKDOWN
L                H               T
 3526            500             0.14
 3575            500             0.15
 0               0               0
 0               0               0
END OF WATERSHED REPORT.
```

WATERSHED START	WATERSHED END	SET WINDOW
AREA START	AREA END	PAGE
TIME CONC. START	TIME CONC. END	COMMENT
FLOOD PLAIN START	FLOOD PLAIN END	GOOD BYE
CHANNEL LENGTH START	CHANNEL LENGTH END	

Program 6

Title: **Manning's Equation Depth Flow**
Author: Richard L. Laramie
        CDM/Resource Analysis
        Waltham, MA
Memory Requirement: 8K
Peripherals: Optional-4907 File Manager
Statements: 88
Files: 1 ASCII Program

The program uses Mannings equation to calculate a depth-flow relationship for a given stream reach. Required input includes slope, Manning's "n", and offset-elevation pairs. Output is a table of water surface elevation area, wetted perimeter, hydraulic radius, $AR^{2/3}$, and flow for each depth.

The program is useful in establishing a depth-flow relationship for an open channel.

No provision to store data.

```
PROGRAM TO COMPUTE THE NORMAL FLOW-DEPTH RELATIONSHIP
FOR AN IRREGULAR CROSS-SECTION
ENTER - D1,S1,N9 - WHERE:
   D1 = OUTPUT TABLE DEPTH INCREMENT
   S1 = STREAM REACH SLOPE
   N9 = STREAM REACH MANNINGS N
.75
.0005
.035
ENTER - NSECTION OFFSET,ELEV PAIRS - X,Y (ENTER E,E TO END)
1.....-70
140
2.....-50
130
3.....-10
126
4.....0
122
5.....10
126
6.....20
130
7.....50
132
8.....150
140
9.....E
E
```

```
DEPTH    ELEV    AREA    WPER    HYD-R   AR2/3    Q
0.00    122.0     0.0     0.0     0.0     0.0     0.0
0.75    122.0     1.4     4.0     0.3     0.7     0.7
1.50    123.5     5.6     8.1     0.7     4.4     4.2
2.25    124.3    12.7    12.1     1.0    13.0    12.4
3.00    125.0    22.5    16.2     1.4    28.1    26.7
3.75    125.0    35.2    20.2     1.7    50.9    48.4
4.50    126.5    51.6    27.9     1.8    77.6    73.9
5.25    127.3    74.0    37.5     2.0   118.5   112.8
6.00    128.0   105.0    47.0     2.2   179.4   170.8
6.75    128.8   142.3    56.6     2.5   263.1   250.5
7.50    129.5   186.6    66.1     2.8   372.6   354.7
8.25    130.3   238.0    76.8     3.1   506.1   481.7
9.00    131.0   298.5    89.8     3.3   665.2   633.2
9.75    131.8   368.5   102.7     3.6   864.0   822.4
10.50   132.5   447.6   114.4     3.9  1112.5  1059.0
11.25   133.3   535.3   125.5     4.3  1408.5  1340.8
12.00   134.0   631.0   136.6     4.6  1751.1  1666.9
12.75   134.8   734.8   147.7     5.0  2142.0  2039.8
13.50   135.5   846.8   158.8     5.3  2586.5  2462.2
14.25   136.3   967.0   169.8     5.7  3084.8  2936.5
15.00   137.0  1095.3   180.9     6.1  3640.1  3465.1
15.75   137.8  1231.7   192.0     6.4  4255.0  4050.4
16.50   138.5  1376.2   203.1     6.8  4931.0  4694.7
17.25   139.3  1529.1   214.2     7.1  5673.1  5400.4
18.00   140.0  1690.0   225.3     7.5  6481.1  6169.6
```


Slope .0005

Manning's "N" = .035
This is a typical cross section for a reach
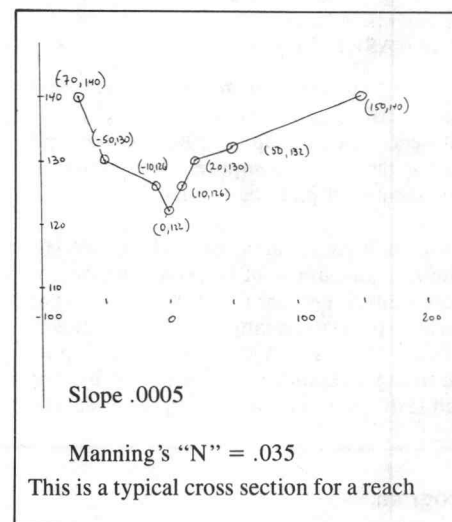
Program 7

Title: **PLANIMETER**
Author: Steve J. Czehura
        The Anaconda Copper Company
        Butte, MT
Memory Requirement: 8K
Peripherals: 4956 Graphic Tablet
              4-Button Cursor
Statements: 117
Files: 1 ASCII Program

The program precisely measures plane areas of any scale and shape. Simply digitize the coordinates of the polygon (point mode) on the 4956 Graphic Tablet. As the coordinates are entered (up to 1000) the polygonal outline will appear on the screen. When input is finished the area is computed and displayed. To ensure accuracy, digitize the polygon a second time the display is enlarged to fill the screen; the percent difference between try one and try two is displayed.

The user inputs the scale units (FT, MI, M, KM, etc.) and the scale. The 4-Button Cursor provides the following:

Z—to digitize a coordinate
1—to indicate the last coordinate (the outline is self-closing; do not enter the first point again)
2—to delete the last point entered
3—to change the scale

No provision to store data.
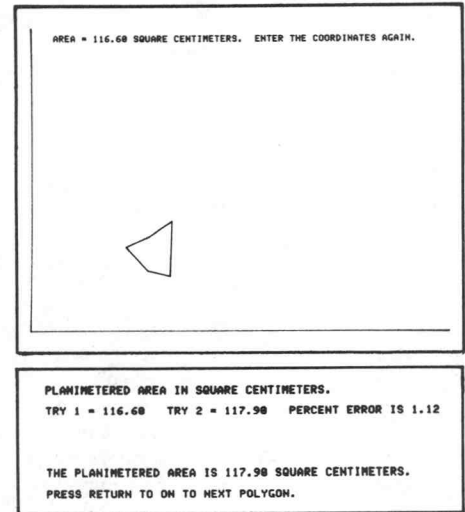
Program 8

Title: **Solution and Plot of Mohr's Envelope**
Author: H.E. Sherer
          Mining Services, Inc.
          Tuscaloosa, AL
Memory Requirement: 32K
Peripherals: 4641 Printer
             4662 Plotter
Statements: 495
Files: 1 ASCII Program

The program uses an iterative search and least squares fit to solve Mohr's envelope. It will accommodate up to 300 uniaxial and triaxial tests, will compute the correlation coefficient and plot the results.

It uses a least squares method to find the cohesion and angle of internal friction for Mohr's envelope; that is, it finds the line that best approximates a tangent line to a series of triaxial Mohr's circles. The user inputs Confining Pressure and Failure Stress for each test. Then, in numeric input mode, the user enters best guess of cohesion in p.s.i. and best guess of angle of internal friction in degrees. Or, in graphic mode, the 4050 System will draw all the Mohr's circles on the screen. The operator determines the best tangent line to all circles and inputs two points that define this line. This input is graphic and controlled by the UDK's.

The program then searches from this initial guess, increments the cohesion, solves for the best angle and compares the residual error to previous results to arrive at a best approximation. This approximation is ‡2.5 p.s.i. cohesion and ‡0.1 degrees for the angle of internal friction.

Using the angle of internal friction computed by the search routine, the points on the circles corresponding to this angle are calculated and a linear regression is run to best fit the envelope and calculate the statistics of fit.

No provision to store data.
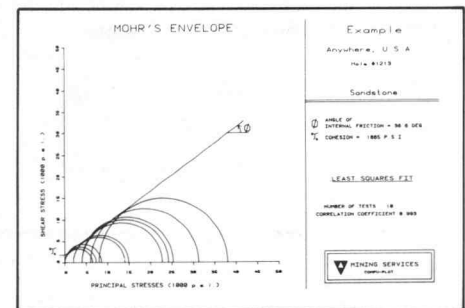
Program 9

Title: **LORAN-C Receiver Interface to 4050**
Author: Peter G. Mauro
        Dept. of Transportation
        Cambridge, MA
Memory Requirement: 8K
Peripherals: Northstar LORAN-C Model 6000 Receiver
             Northstar Interface Adaptor 6700
             Option 1 Data Communications Interface
Statements: 94
Files: 1 ASCII Program
      Requires pre-marked data files

The program accepts serial information from a LORAN-C receiver and stores it on tape. It will plot the latitude and longitude position of the LORAN-C receiver on the 4050 Screen as both are driven along a roadway. It will plot directly from the receiver or from the data stored on tape.

It doesn't plot the latitude and longitude position directly but takes a running average of five consecutive readings to smooth out the plotted curve.

Areas of application include emergency vehicle dispatch and fishing craft path plotting.

Program 10

Title: Sky Screen

Author: Captain S.K. Sanford
   Aberdeen Proving Ground, MD

Memory Requirement: 8K

Statements: 97

Files: 1 ASCII Program

The program computes the elevation angle (in mils) for a number of sky screen devices to provide approximately maximum internal target window area coverage with no internal dead spaces.

The aiming angle in mils of each sky screen is displayed, as well as a drawing of the sky screens (numbered points) as they will acquire the target window (box).

User prompted input:

   Number of sky screens
   Window width, height and center altitude
   Displacement, altitude and fan angle

See TEKniques Vol 2 No. 8 pp 8-9, or TEKniques reprint "Data Acquisition and Analysis," AX-4450, pp 14-15, for an explanation of Sky Screens.


```
                                    *** SKY SCREEN ELEVATIONS ***
                                    SKY SCREEN        ANGLE (MILS)
                                       1                 1354.35
                                       2                  966.30
```
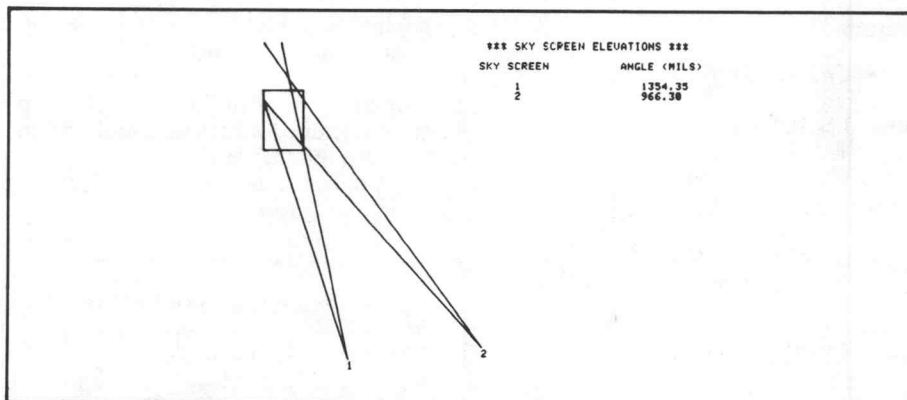


```
              *** SKY SCREEN: TARGET WINDOW ACQUISITION ***

AUTOCOPY? (Y/N): N

(TYPE 0 TO QUIT)

ENTER NUMBER OF SKY SCREENS: 2

ENTER WINDOW WIDTH, HEIGHT, AND CENTER ALTITUDE: 300 500 2000

ENTER DISPLACEMENT, ALTITUDE, AND FAN ANGLE FOR
   SKY SCREENS FROM CLOSEST TO FARTHEST:

FOR SKY SCREEN 1: 500 0 100

FOR SKY SCREEN 2: 1500 100 100
```

Program 11

Title: GAZINTAMAP

Author: Gene Turner
   California State University
   Northridge, CA

Memory Requirement: 32K

Peripherals: 4662 Plotter
   4051 Binary ROM

Statements: 1673

Files: 6 ASCII Program
   2 ASCII Data (example)
   1 Binary Data (example)
   Requires dedicated tape

The program displays graduated symbols on a base map. The 4662 Plotter is used to input point for the symbols and line segments of a background map. Magnitude data for the point locations is input from the keyboard or a tape file.

The program is controlled by a driver program which appends and deletes various subprograms as needed. Routines include:

LABEL

Print labels (user establishes left and right limits on the map space; labels may be left justified or centered)

GEO

Input and store line segments and point locations (up to 200 points may be recorded in any one segment; a priority of 1—9 is set for each segment; pen colors may be changed when a different priority is encountered)

HELP

Instructions about other routines

DATA

Input and store up to 8 variables per data point

MAP

Plot maps on the screen or plotter; options available:

   Input point coordinates
   Input correspoiding data values (input two values and ratio them)
   Select range graded symbols
   Select limits for continuous range of data values
   Select minimum priority for line segments
   Change size of symbols (default largest scaled to 1 sq. inch)
   Window or reduce size of map
   Plot square, diamond, cross or triangle
   Plot legend

A Driver Program

Append and delete routines


```
              MAJOR WESTERN CITIES
                1970 POPULATIONS

                                    LEGEND

                                ALBUQUERQUE
                                BILLINGS
                                BOISE
                                DENVER
                                LAS VEGAS
                                LOS ANGELES
                                PHOENIX
                                PORTLAND
                                SACRAMENTO
                                SALT LAKE CITY
                                SAN DIEGO
                                SAN FRANCISCO
                                SEATTLE
                                SPOKANE
```
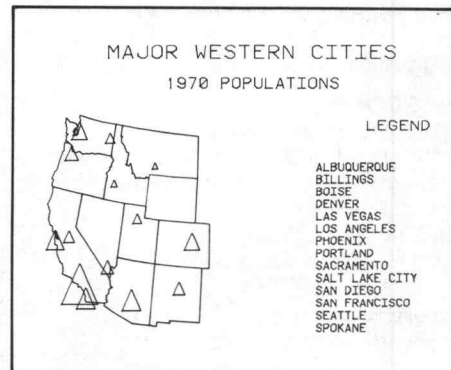
Program 12

Title: **4907 U.S. Map**

Author: Les Brabetz
        Tektronix, Inc.
        Wilsonville, OR
Memory Requirement: 32K,

Peripherals: 4907 File Manager
             4952 Joystick

Statements: 256
Files: 3 ASCII program
       97 Binary Data

U.S. Map

The U.S. Map program demonstrates accessing and displaying a segmented data base existing on the 4907 File Manager as opposed to reading and clipping an entire serial data base in order to view a smaller portion.

The master data base is read and a highly detailed map of the continental United States, with grid, is displayed on the 4050 graphic screen.

The user is then requested to select a lower left corner and upper right corner using the 4952 Joystick. Only those segment files containing the selected portions of the map are read permitting rapid display.

The routines included in the U.S. Map program are: disc formatting, transfer from tape to disc of the 96 segment data files, master data base, and routine to display the map and its segments.
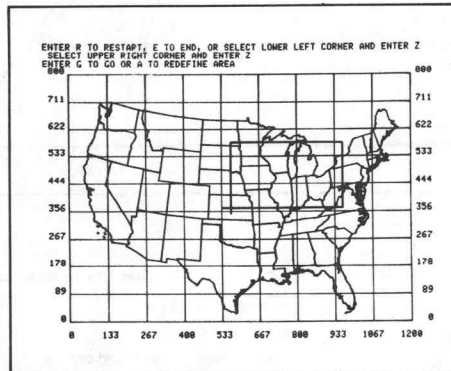
Program 13

Title: **SCOPE**
Author: Devon Nickerson
        U.S.F.S. Logging Systems Group
        Six Rivers National Forest
        Eureka, CA
Edited by: Steve Wells
           Tektronix, Inc.
           Seattle, WA
Memory Requirement: 32K
Peripherals: 4956 Graphic Tablet
             Optional-4662 Plotter
Statements: 1178

Files: 8 ASCII Program
       4 Binary Data
       Requires dedicated tape &
       pre-marked data files

"SCOPE," a timber management planning tool, depicts a partial cut timber stand in perspective view. The timber stand is drawn with a TV-scan approach, producing a panoramic reproduction. By specifying the percentage of timber to be removed in a partial cut operation, the planner can get a feel for the textural change in the timber canopy that results from his management activities. This program is similar to CDC 6400 program "PREVIEW" developed at SUNY, Syracuse, NY, by Myklestad and Wager (see USDA Forest Service Research Paper NE-355, 1976). However, "SCOPE" was developed for a desktop computer system.

Using the TEKTRONIX 4050 and 4956 digitizing tablet, and optionally a 4662 Plotter, the user delineates the boundary of a proposed unit, the boundary of any unforested land within the unit boundary, and the top and bottom points of skyline corridors. Next, the user prepares a matrix of elevation observations by digitizing the contours on the topographic map. Then the user describes the timber stand and the cut. Finally, the user identifies a vista point, and the depiction of the stand is drawn on the Plotter.

"Trees" are described on the basis of a series of random numbers. The height, crown ratio, crown width, DBH, and position of each tree are functions of the stand characteristics and the random number. As a result, the stand is convincingly natural in appearance.

A topographic map provides the basis for input data. Use a map of the largest possible scale with the most detailed contour information.
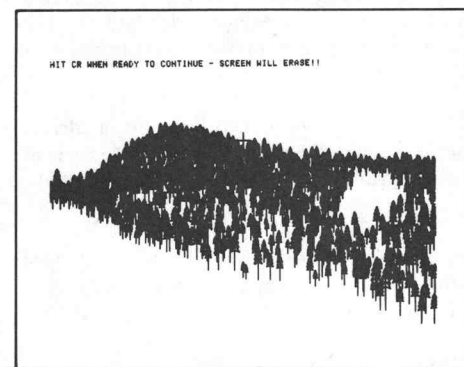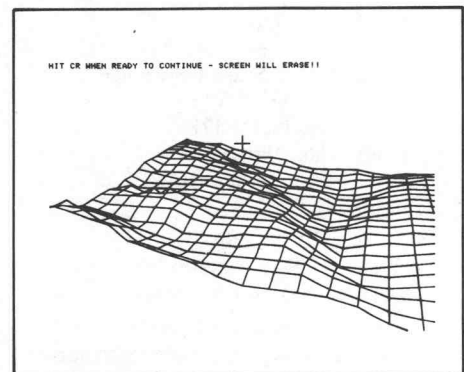
Program 14

Title: **Globe Rotation**
Author: Donald N. Sweetnam
        Jet Propulsion Lab
        Pasadena, CA
Memory Requirement: 8K
Statements: 149
Files: 1 ASCII Program
       Requires pre-marked file

This program allows a user to view a global representation of a planet or spherical surface from any direction. This is accomplished by generating a reference globe and rotating about any or all of the three axes.

The reference globe is generated in a right hand Cartesian coordinate system with the Z-axis pointing toward the north pole, the X-axis pointing through the prime (0) meridian and the Y-axis completing the system. The reference globe is positioned on the 4050 screen with the Z-axis up, the X-axis to the left and the Y-axis toward the user. The step to create the reference globe need only be done once since the coordinates are saved on tape in a user specified file.

Desired rotations are then chosen, the rotations made, and the resulting globe projected onto the display. Longitude lines are provided every 30 degrees as are latitude lines. Longitude coordinates are plotted every 6 degrees and latitude coordinates every 3 degrees. Hidden coordinates are not displayed.

The program employs extensive use of the User Definable Keys.
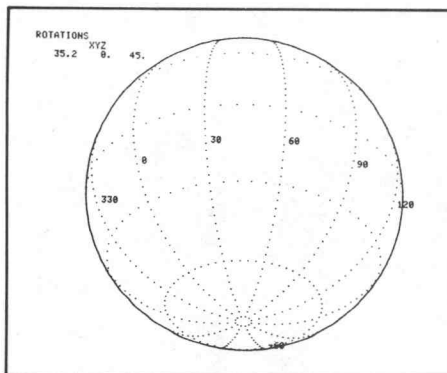
MECHANICAL ENGINEERING T1
062-5979-01

A collection of nine programs comprises a variety of design aids for the mechanical engineer. The individual abstracts describe each program.

Two of the programs should be transferred to their own dedicated tapes. The documentation contains instructions for accomplishing the transfers.

Title/
Previous Abstract #

Pipe Flow
51/00-1201/0

Bastard Gear Calculations
51/00-1601/0

Belt Length Calculation
51/00-1603/0

Analysis Of A Proving Ring Calibration
51/00-1604/0

Shear and Moment Diagrams for Determinate Beams
51/00-1605/0

Fatigue Analysis
51/00-1608/0

Interactive Beam Analysis
51/00-1602/0

Beam Analysis II
51/00-1607/0

NASTRAN Deck Generator for Electronic Enclosure Analysis
51/00-9528/0

Program 1

Title: **Pipe Flow**
Author: H. E. Sherer
        Mining Services, Inc.
        Tuscaloosa, AL
Memory Requirement: 16K
Peripherals: 4641 Printer
Statements: 174
Files: 1 ASCII Program

The program uses the 'Colebrook' Formulas of turbulant pipe flow to solve for (1) Head Loss, (2) Flow or, (3) Pipe Diameter for fluids flowing in pipes. Minor losses may be taken into account, along with various fluid parameters.

The user inputs a title, fluid description, pipe description, fluid viscosity in Centipoise, sum of minor losses (inlets, bends, valves, contractions, etc.), fluid density. The program will solve for the following with additional inputs:

1. Head loss—input pipe length, flow quantity, Epsilon (roughness factor chart provided), diameters and increment;
2. Discharge—similar to head loss except input water pressure as feet of head, friction guess;
3. Diameter—similar to discharge.

The output will be directed to a 4641 Printer.

	DIAMETER (ft.)	EPSILON (ft.)	LENGTH (ft.)	HEAD LOSS (ft.)	VELOCITY (ft/s)	QUANITY (cu.ft/s)	REYNOLDS NUMBER (VDRho/Mu)	FRICTION FACTOR (f)
				Test Program PIPE FLOW				
DENSITY: 62.4 (lbs./cu.ft.)	0.17	0.000850	590.0	60.0	5.7	0.1	8.87E+004	3.23E-002
	0.25	0.000850	590.0	60.0	7.4	0.4	1.71E+005	2.88E-002
VISCOSITY: 1.00 (Centipoise)	FLUID: Water							
MINOR LOSSES: 3.2 (K)	PIPE: 2 Inch and 3 Inch I.D. Cast Iron (New)							

Program 2

Title: **Bastard Gear Calculations**
Author: Le Roy Nollette
        Tektronix, Inc.
        Wilsonville, OR
Memory Requirement: 24K
Peripherals: Optional-4662 Plotter
Statements: 206
Files: 1 ASCII Program

A bastard gear may be used to drive three other gears simultaneously, which can be of equal or unequal radii. Given the radii S, T, and U, and the distances K, H, L, and M, the program calculates the size (radius R) and location (distances X and Y) of the bastard gear. The program also plots resulting gear system.
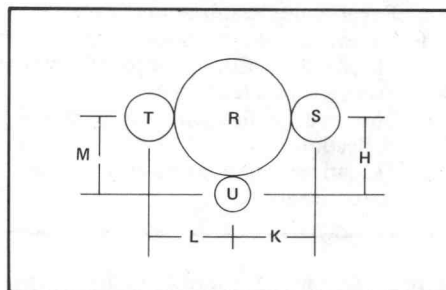
Program 3

Title: **Belt Length Calculation**
Author: Allen G. Hahn
       Hesston Corporation
       Hesston, KS
Memory Requirement: 16K
Statements: 286
Files: 1 ASCII Program

With this program, you enter the location of any number of pulleys, the pulley diameters and which side of the enclosed area the pulleys are on. The User Definable Keys are then used for the following options:

Calculate the belt length required to go around the pulleys in the defined manner.

Enter a desired belt length and the number of a movable pulley. Select one of three types of movement: 1) pivoted arm, 2) straight slot, 3) neither. In the first two choices the program will iteratively move the pulley, calculate length, compare to desired length and move again. When the desired belt length has been reached

within ± 0.1 unit or 20 iterations have been performed, the results will be tabulated. If the desired length is shorter than is possible, when the pulley leaves the belt a warning will be printed. If the final length is not within ± 0.1 unit of the desired length, and the pulley has not left the belt, calculations may begin again at this point.

In the third choice, the program will print the amount the present belt length is shorter or longer than the desired length and will request new coordinates for the movable pulley.

Change data on any pulley in the drive.

Draw a picture of the drive.

Configure a completely new drive.

End the session and return to the menu.

NOTE: This program also gives approximate results for roller chain.
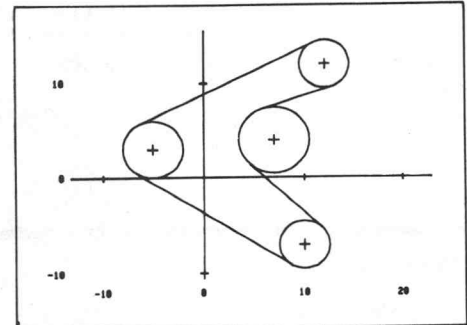
Program 4

Title: **Analysis Of A Proving Ring Calibration**

Author: Colin MacKenzie
       National Research Council
       Ottawa, Ontario, Canada
Memory Requirement: 32K
Peripherals: 4662 Plotter
            4051R05 Binary ROM Pack
Statements: 655
Files: 2 Binary Program
      1 Binary Data (Example)

The program takes data obtained during calibration of a proving ring (applied load, initial zero reading, reading at load, final zero reading and temperature, taken in increments of approximately ten percent of capacity load in three independent runs of ten loadings) and derives an analytical expression for the calibration as a second degree polynominal in load, relating load to deflection for the standard temperature of 23° C. From this expression, calibration

tables, relating deflection in divisions to load in pounds-force and newtons, are computed.

Also produced by this program are:

1. A graph of the difference of experimental readings and calibration equation versus percent of capacity load.

2. A calibration information page which could be included along with the calibration tables and graph in a report of the calibration.

3. The following tables:

   a. Input data (Keyboard or tape)
   b. Corrected and average deflections
   c. Experimental calibration factor
   d. Experimental deviations
   e. Fitted deflection compared with average observed deflection
   f. Observed deflection minus fitted deflection
   g. Deviations from average and standard deviations

h. Mean temperature, sum of squares of deviations, standard deviations and uncertainties
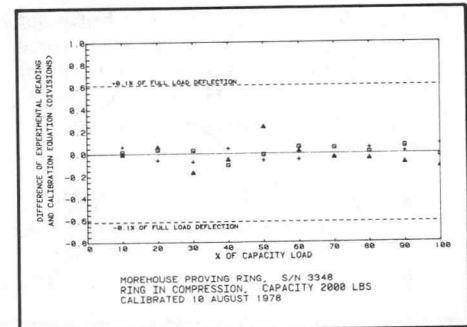
Although written to analyze data obtained from the calibration of proving rings using a primary force standard, this program may be used with some modifications to include calibration of other force-measuring instruments.

Program 5

Title: **Shear and Moment Diagrams for Determinate Beams**

Author: David Q. Fletcher
       University of the Pacific
       Stockton, CA
Memory Requirement: 24K

Statements: 296
Files: 1 ASCII Program

The program accepts beam loading information in the form of magnitudes and locations of concentrated loads, distributed loads

(uniform or linearly varying) and concentrated moments. It computes reactions and then displays a beam loading diagram and plots moment and shear diagrams. Any statically determinate beam can be analyzed. In addition the magnitude and location of the absolute maximum values of shear and moment are given.
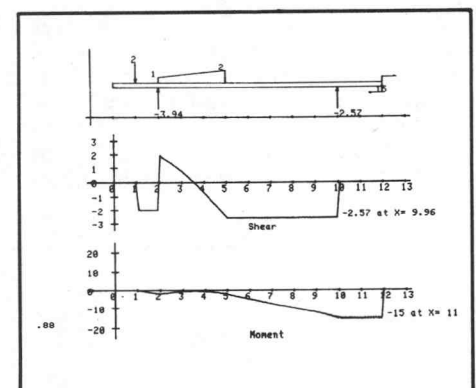
Program 6

Title: Fatigue Analysis

Authors: Y.W. Luk
Graduate Student
L.D. Mitchell
Professor
Virginia Polytechnic Inst.
& S.U.
Mechanical Engineering Dept.
Blacksburg, VA

Memory Requirement: 22K

Statements: 568

Files: 1 ASCII Program

Machine members are often found to have failed under the action of repeated or fluctuating stresses, and yet an analysis reveals that the actual maximum stresses were below the yield strength. These failures usually are from stresses repeated for large number of times. This failure is called a fatigue failure.

There are many theories that predict the fatigue failure. The six most generally accepted are: modified Goodman fracture line, modified Goodman yield line, Soderberg line, Gerber line, Quadratic line, and Kececioglu line. These six failure lines are available in the program to size failure. Any equivalent stress theories are allowed. It can also compute the significant endurance limit with the theoretical stress concentration factor and other physical and environmental parameters supplied by the user.

Input Data Required. Units can be either in English or SI system. The following data are needed:

1. Ultimate tensile strength of the material, psi or Pa.
2. Yield strength of the material, psi or Pa.
3. Significant endurance limit, psi or Pa.
4. Moment causing alternating stress, lb-in or N-m.
5. Moment causing a steady stress, lb-in or N-m.
6. Alternating axial force, lb or N.
7. Steady axial force, lb or N.
8. Alternating torque, lb-in or N-m.
9. Steady torque, lb-in or N-m.
10. Safety factor, dimensionless.
11. Lower limit of the dimension, in or m.
12. Upper limit of the dimension, in or m.

If the significant endurance limit is not known, the following physical and environmental parameters are required for computing the significant endurance limit.

13. Type of surface finish.
14. Reliability, %.
15. Operating temperature, °F or °C.
16. Theoretical stress concentration factor.
17. Notch sensitivity factor (optional).
18. Notch radius (optional), in or m.
19. Type of material.
20. Type of loading.
21. Miscellaneous effect factor (optional).
22. Shape of cross section.
23. Endurance limit for R.R. Moore rotating beam specimen (optional), psi or Pa.
24. Number of cycles.

The Failure Line on which this chart is based is the Modified Goodman Fracture Line.

```
$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$
Tensile Strength, Su..........................= 200,000 psi
Yield Strength, Sy............................= 150,000 psi
Significant Endurance Limit, Se'' @500000 cyc.= 21,395 psi
Smallest dimension tried......................= 0.01 inches
Largest dimension tried.......................= 10.00 inches
Safety Factor, N..............................= 1.00
Moment causing alternating stress, M1.........= 2,400.00 lb-in
Steady torque, T2.............................= 1,200.00 lb-in

The following factors are used for computing Se''':
Surface factor (Ka)                   = 0.64
Size and shape factor (Kb)            = 0.81
Reliability factor (Kc)               = 0.81
Temperature factor (Kd)               = 0.95
Fatigue Strength Reduction factor (Ke)= 0.42
Miscellaneous factor (Kf)             = 1.00
Endurance Limit for Rotating-beam Specimen (Se') = 100,000 psi
Significant Endurance Limit for infinite life (Se') =16,960 psi

The Failure Line selected is Modified Goodman Fracture Line.
The failure equation is (Sa/(R2$Se'')^M + (R1$Sm/Su)$p = 1.
where M=1
where P=1
where R1=1
and where R2=1

The design dimension is 1.2911 inches

$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

Do you wish to convert the design dimension to SI unit? (Y or N)Y

The design dimension is 0.0328 M
```

```
$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$
$                                                          $
$         FATIGUE ANALYSIS PROGRAM, ANALYTICAL             $
$                                                          $
$           By Yiu Wah Luk, VPI & SU, Spring 1978          $
$                                                          $
$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$

You have entered a FATIGUE RESISTANT, INTERACTIVE DESIGN routine.
Components will be sized to prevent fatigue failure.

Do you wish to use English Units? (Y or N)Y

We will use English Units throughout this routine.

Please enter the strength of the material to be used.

Tensile Strength, in psi; Su    = 200000
Yield Strength,  in psi; Sy     = 150000

Do you know the Significant Endurance Limit of the material? (Y or N)N
```

```
This section of the program will calculate the Significant
Endurance Limit.

Enter the # for the types of surface finish used.
#1 for polished finish.
#2 for ground finish.
#3 for machined or cold drawn.
#4 for hot rolled.
#5 for as forged.
3

What is the reliability in %?99

What is the operating temperature in Degree F ?190

Do you know the Theoretical Stress Concentration Factor (Kt)?Y

Theoretical Stress Concentration Factor = 2.5

Do you know Notch Sensitivity (q)? (Y or N)N
What is the notch radius in inches?0.02

Is the material steel? (Y or N)Y
Is it under bending or axial loading? (Y or N)Y

Is there any miscellaneous-effect factor? (Y or N)N

The S-N curve is used for this determination.
A Log-Log or a Log-Linear S-N curve will be used.
The finite life region is 0.9$Su @1E3 cycles to Se'' @1E6 cycles.
What method do you want to use for computing the
Significant Endurance Limit (Se''')?
Enter #1 for Log-Log method.
Enter #2 for Log-Linear method.
1
```

```
Is the cross section circular? (Y or N)Y

Do you know the Endurance Limit (Se') for rotating-beam
specimen? (Y or N)N

Is the design life infinite? (Y or N)N
Number of cycles = 500000
```

Using the same input data, the component is redesigned by the other five fatigue failure lines. A similar chart is displayed for each Failure Line. All six results are listed in the following table for comparison.

Type of Failure Line used	Design Diameter in	m
Modified Goodman fracture line*	1.2911	0.0328
Modified Goodman yield line*	0.7491	0.0190
Soderberg line	1.2983	0.0330
Gerber line	1.2696	0.0322
Quadratic line	1.2691	0.0322
Kececioglu line (with b=1.5)[1]	1.2693	0.0322

*If the user subscribes to the Modified Goodman theory, the largest dimension of the two Goodman solutions must be selected.

[1]This is an arbitrary choice of exponent used for this example only.

Normally, all these analyses are not carried out. Only the analysis that corresponds to the user's selected theory is computed. But the program provides the capability to redesign the component using other fatigue failure theories in order that the user can choose among alternatives.

From the results listed in the table, the smallest dimension is obtained by modified Goodman yield line. This result is not correct for a fatigue design because the modified Goodman theory demands that one considers the yield line and the fracture line. Thus, the largest dimension of the two Goodman solutions must be selected. The most conservative solution is obtained using Soderberg line. This is not always true. It depends upon the location of the load line. In this example, the solutions from modified Goodman line, Soderberg line, Gerber line, Quadratic line, and Kececioglu line are quite close. This is true only for this particular example because of the load line. Other examples may give more significant differences between these theories.

```
You will now be requested to supply the PARAMETRIC DESIGN STRESS
EQUATIONS for your design problem.
You must write these equations in BASIC. Use the following instructions.
If you are unfamiliar with the development of such equations,
see user's guide and its appendix for guidance.
Enter component loads starting with line 6000 incrementing by 10's.
Use M1=Moment causing alternating stress (lb-in).
Use M2=Moment causing a steady stress (lb-in).
Use F1=An alternating axial force (lbf).
Use F2=A steady axial force (lbf).
Use T1=An alternating torque (lb-in).
Use T2=A steady torque (lb-in).
Use N=Safety factor.
Enter the numeric value for each of the variables used in
your stress equations.
Do this before you enter your stress equations.

Enter your stress equations starting with line 6100
incrementing by 10's.
Use A1=Alternating stress.
Use A2=Mean stress.
Use PI=Pi.
Use D=Basic dimension. N.B., All dimensions should be given in terms of
D. In case of rectangular component, use proportions.
After your stress equations are entered, type a numbered return
statement. Then type run 600.
EXAMPLE:...........................................
The following equations are in English Unit.
6000 T2=1200.
6010 M1=2400.
6020 N=1.0
6100 A1=N$M1/(PI$D^3/32)
6110 A2=0.866$N$T2/(PI$D^3/32)
6120 RETURN
RUN 600
```

```
6000 T2=1200
6010 M1=2400
6020 N=1.0
6100 A1=N$M1/(PI$D^3/32)
6110 A2=0.866$N$T2/(PI$D^3/32)
6120 RETURN
RUN 600
```

```
Select the fatigue failure line to be used in the design.

If Modified Goodman Fracture Line, enter MGF
If Modified Goodman Yield Line, enter MGY
If Soderberg Line, enter S
If Gerber Line, enter G
If Quadratic Line, enter Q
If Kececioglu Line, enter K
MGF

The Failure Line selected is Modified Goodman Fracture Line.
The failure equation is (Sa/(R2$Se'')^M + (R1$Sm/Su)$p = 1.
where M=1
where P=1
where R1=1
and where R2=1
Do you wish to change any parameters? (Y or N)N

The following entries will establish the limits on a Half
Interval Search for the solution to your problem.
What is the smallest basic dimension that you wish to try?
Give your answer in inches. Do not answer 0.0, 0.01
What is the largest dimension, in inches? 10
```

Program 7

Title: **Interactive Beam Analysis I**

Authors: Professor Larry D. Mitchell,
Yiu Wah Luk
Virginia Polytechnic Inst.
Blacksburg, VA

Memory Requirement: 32K
Statements: 567
Files: 2 ASCII Program

This is a beam analysis program which solves static or dynamic (forced, undamped vibration) response.

One of the most frequently encountered engineering designs is beam because it can be used for modeling many structures. This program, using transfer matrix method, computes and plots the curves of deflection, slope; moment, and shear along the beam. Static and forced, undamped dynamic analysis can be performed for beams of uniform or variable cross section. Uniformly or linearly-varied distributed loads, concentrated point loads, applied moments, or combinations of all three may be applied.

This program allows any combination of pinned, fixed, free, or guided flexural boundary conditions. Even normally kinematically unstable conditions can be handled if sufficient internal supports are provided. In-span support can be elastic springs and/or elastic moment spring. Modeling for dynamic response uses lumped mass.

It does not handle rigid in-span indeterminants.

Units can be either in English or the S.I. system. The beam is first divided into several sections, such that each section has the same distributed stiffness and a point element at the end, if any. For each section, inputs required are:

1. Length of section
2. Modulus of elasticity
3. Area moment of inertia
4. Magnitude of uniformly distributed load
5. Magnitude of linearly varied distributed load
6. Magnitude of concentrated load
7. Magnitude of moment
8. Stiffness of the support
9. Support moment stiffness
10. Magnitude of concentrated weight
11. Weight moment of inertia
12. Frequency
13. Type of vibration of the beam or rotor

Several examples are included in the documentation.

Program 8

Title: **Beam Analysis II**

Authors: Y.W. Luk
Professor Larry D. Mitchell
Virginia Polytechnic Inst.
Mechanical Engineering Dept.
Blacksburg, VA

Memory Requirement: 32K

Peripherals: 4051R05 Binary Program
Loader
4051R01 Matrix ROM

Statements: 1661

Files: 6 Binary Programs
2 Binary Data (examples)
First 8 files on tape or recode

One of the most frequently encountered engineering designs is beam because it can be used for modeling many structures. This program, using Transfer Matrix Method, provides the following analyses for an undamped beam system:

1. Free vibration (eignevalue — eigenvector)

2. Static Response

3. Forced dynamic response at a particular frequency

4. Frequency response at a point along the beam

5. Animation of beam motion in the dynamic case

This program computes and plots the curves of deflection, slope, moment and shear along the beam for all four analyses listed above. Beams of uniform or variable cross-section can be entered. Uniformly or linearly-varied distributed loads, concentrated point loads, applied moments or combinations of all three may be applied to static, forced dynamic or frequency response analysis. It also allows any combination of pinned, fixed, free or guided flexural boundary conditions, even normally kinematically unstable conditions can be handled if sufficient internal supports are provided. In-span support can be elastic springs and/or elastic moment spring. Static indeterminary to any order is handled. Modeling for dynamic responses uses lumped mass. In the dynamic case, the beam motion can be animated in time and space.

All the input data can be stored on the tape and recalled for future use. It also provides the option of using either English or SI units.

Program limitations

This program has the following limitations:

1. It handles only undamped beam system.

2. It will not handle rigid in-span indeterminate supports but they can be approximated by assigning a large value for the stiffness or rotary stiffness of the supports, e.g., 1×10^{10} lb/in or N/m, or 1×10^{10} lb-in/rad or N-m/rad. 1×10^{20} seems to be the limit for a beam having 5 sections before numerical difficulty is encountered.

3. The system must be loaded within the elastic range.

Conclusion

This interactive computer-aided analysis routine is almost unlimited in the complexity of multi-supported and load beams. It is much easier to use than other "canned" computer programs, especially those that are written for a batch environment; i.e., computer cards are used as input and line printer as output. It has error feedback, structure verification and graphical output. All these enable the user to enter the data correctly and get the correct result in a short time.

This program is much more powerful than Interactive Beam Analysis I program 7; however, that program does a couple of things that Beam Analysis II doesn't.
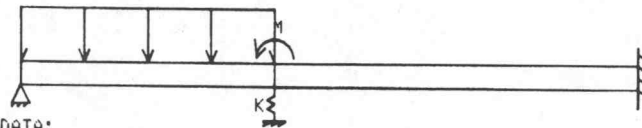

```
Drawing of the Beam



DATA:
For section #1:
Length of this section........................= 1.0000E+001 in
Modulus of Elasticity.........................= 3.0000E+007 psi
Area Moment of Inertia........................= 4.7000E+000 in↑4
Magnitude of uniformly distributed load.......= 1.0000E+002 lb/in
Magnitude of Moment...........................=-1.0000E+004 lb-in
Stiffness of Support..........................= 2.8200E+005 lb/in

For section #2:
Length of this section........................= 2.0000E+001 in
Modulus of Elasticity.........................= 3.0000E+007 psi
Area Moment of Inertia........................= 4.7000E+000 in↑4


          *** Continue with User Definable Key ***
```

Program 9

Title: **NASTRAN Deck Generator for Electronic Enclosure Analysis**

Author: Erwin Vogel
Fairchild Industries
Germantown, MD

Memory Requirement: 32K

Peripherals: RS-232 Data Communications Interface
Host w/NASTRAN Software

Statements: 1029

Files: 2 ASCII Program
1 New
First 3 files or recode 4 lines

An interactive tutorial program creates three-dimensional models for structural analysis.

The engineer enters 12 coordinates specifying the corners of any rectangular or skew box. Each panel is subdivided and the material types and thickness for each keyed in. Number and location of cutouts, number and weight of concentrated masses for each

panel along with support pins and locations are input. No negative numbers are allowed.

The program calculates the data, formats it to NASTRAN requirements and writes it to tape. The data may then be transmitted over the RS-232 to the host computer where bulk data and JCL cards are automatically keypunched.

The program's step-by-step graphic tutorial

prompting enables the engineer without computer experience to use it with ease.


```
This is the development of the box, to scale








Press COPY to save this page, then press RETURN
```

PROGRAMMING AIDS T1
062-5971-01

PROGRAMMING AIDS T1 is a tape collection of 16 programs to aid you in creating or dissecting a 4050 BASIC program. Employ these routines to produce your overlays, structure program flow, track variables, convert from FORTRAN to BASIC, draw flow diagrams and aid you in other programming techniques. The individual abstracts describe each program.

Two of the programs maintain their own data files and must be transferred to other tapes before execution. The documentation for each gives specific instructions for accomplishing the transfers.

Title/
Previous Abstract #

Overlay Drawing Program
51/00-9537/0

Enhanced Program Listings
51/00-8044/0

REMark Outliner
51/00-8035/0

Tape Directory
51/00-8026/0

List Program's Variables
51/00-8002/0

Cross-Reference & List Program Variables
51/00-8004/0

Device Address Adding Program
51/00-8032/0

Log/Linear Axis Labeling Routine
51/00-9504/0

Dashed Lines
51/00-9508/1

Calendar Routines (7-Day Week)
51/00-0902/0

Calendar Routines (5-Day Week)
51/00-0903/0

FORTRAN to BASIC Converter
51/00-7003/0

Flow Diagrammer (tape)
51/00-8015/0

Flow Diagrammer (disk)
51/07-8015/1

Segmented Data Base
51/07-9522/0

Windowing Routines
51/07-9522/0

Program 1

Title: **Overlay Drawing Program**
Author: LeRoy Nollette
      Tektronix, Inc.
      Wilsonville, OR
Memory Requirement: 16K
Peripherals: 4662 Plotter
Statements: 250
Files: 1 ASCII Program
     2 ASCII Data (Sample Overlays)
     Optional-Pre-MARked data files

The program draws an overlay on the 4662 Plotter that can be cut out and placed over the User-Definable Keys. Key descriptions may be entered from the keyboard. Data may be saved on a pre-MARked data file and re-drawn at a later date.

The program may be modified (one line of code) to draw a large copy of the overlay and then reduce it on a copy machine having reduction capabilities.

By changing one line of code the user may preview the overlay on the screen.

Program 2

Title: **Enhanced Program Listings**
Author: Tim Giesbers
      Tektronix, Inc.
      Beaverton, OR
Memory Requirement: 8K
Peripherals: Optional—4641 Printer
Statements: 144
Files: 1 ASCII Program

The program will list any ASCII program file, or consecutive files, stored on tape.

The list can be either to the 4050 screen or a 4641 Printer. If the list is to the screen, copies may be made automatically on a 4631 Hard Copy Unit.

The listing includes file numbers and the length of each file is given in bytes at the end of the listing.

Statements inside FOR/NEXT loops are indented, and REM statements are separated from other program lines by a blank line for emphasis.

New pages are automatic with the user specifying the number of lines per page and the length of the pause between pages. There is no provision for wraparound or truncation of a line which is longer than the width of the printer paper.

User input:

   First file number
   Last file number
   Output device number
   Automatic copies Yes/No
   How many lines per page
   How many seconds of pause

Program 3

Title: **REMark Outliner**
Author: Mallory M. Green
U.S. Dept. of HUD
Washington, D.C.
Memory Requirement: 8K
Statements: 141
Files: 1 ASCII Program

REMark Outliner is intended as a tool for the programmer who writes a structured program. It inputs a structured ASCII program and prints out a program outline. The outline includes subroutine names, line numbers and flow between subroutines.

The following programming techniques are required for REMark Outliner to work effectively.

1. Subroutines make up the program with GOSUB or GOSUB OF statements controlling program flow.

2. Subroutines begin with REMark statements describing the subroutine's function. These REMark statements are separated from other REMark statements by special characters; i.e., REM * or REM / and so on.

3. Hierarchical subroutines.

4. Program's name contained in first program REMark.

REMark Outliner uses the special REMark statement to identify the modules and it traces program flow only through GOSUB or GOSUB OF statements. It makes two passes through a program: the first pass creates a table of subroutine locations; the second pass prints the program outline.

```
                BARGRAPH II - "@B2/MAIN" - LAST REVISED 9/25/79
M#   LINE#            MODULE NAME                      MODULES CALLED
1    2      USER KEYS                                  12 2 3 8 13 13
2    100    PROGRAM INTRO & INITIALIZATION             4 6 5 10 11
3    1090   PROGRAM RESTART                            13
4    1190   NEW CHART
5    1240   READ GRAPH FROM DISK                       7
6    1370   READ PLOT FROM TAPE                        7
7    1463   TIME TO BAR CONVERSION                     3
8    1480   SELECT BAR FORMAT                          9
9    1897   CHECK PLOTTER                              9
10   1928   LIST PLOTS ON TAPE OR DISK
11   2030   DELETE PLOTS FROM DISK OR TAPE
12   2240   SAVE GRAPH TITLES AND DATA
13   2650   OVERLAY CONTROL MODULE
14   2870 * OVERLAY TARGET
```

```
                REMARK OUTLINER PROGRAM  '#OUTLINE'  - 9/25/79
M#   LINE#            MODULE NAME                      MODULES CALLED
1    110    CONTROL MODULE                             2 3 4 5
2    170    SELECT REMARK TYPE AND FILE NUMBER
3    300    FIRST REMARK FOR PROGRAM TITLE
4    410    FIRST PASS TO RECORD MODULE LOCATIONS
5    530    SECOND PASS CONTROL MODULE                 6 7 8
6    680    PRINT FIRST REMARK AS PAGE TITLE
7    760    IF MODULE NAME - PRINT                     6
8    900    EVALUATE GOSUB TYPE                        9 10
9    1070   NORMAL GOSUB TYPE                          11
10   1120   GOSUB OF TYPE                              11 11
11   1240   PRINT GOSUB MODULE NUMBER
12   1420   SET EOF FLAG
```

Program 4

Title: **Tape Directory**
Author: Nick Ogbourne
Comalco Aluminum Ltd.
George Town, Tasmania,
Australia
Memory Requirement: 8K
Peripherals: Optional-4051R06 Editor ROM
Statements: 90
Files: 1 ASCII Program
1 ASCII Text

The program, located as the first ASCII program file on a tape, operates using the AUTOLOAD, provides a tape 'directory' multipage if necessary, and controls access to, and execution of program files.

The user creates and maintains an 'index' in File 2 (ASCII) which provides file number, program name and program description to the 'directory' program. File 2 may be updated using the 4051R06 Editor ROM or a simple BASIC program. (An example of the index is included.)

It is not necessary to specify to the directory the type of the program (ASCII or Binary). Programs not required to be accessed by the directory, data files and text files may be recorded in file 2, providing a rapid means of 'TLIST'ing a tape.

```
                PROGRAM DIRECTORY   TAPE:-'14'  ' APPLICATIONS LIB.'
PROGRAM | NUMBER |          PROGRAM DESCRIPTION
ASCII P |   1    | ASCII program file.
ASCII T |   2    | ASCII text file.




                        Select your program number *
```

Program 5

Title: **List Program's Variables**
Author: Brian Diehm
Tektronix, Inc.
Wilsonville, OR
Memory Requirement: 8K
Statements: 105
Files: 1 ASCII Program

This program reads a tape file containing a BASIC ASCII program and prints an alphabetized list of all the variables used in that program. The program first asks the user which tape file contains the program to be analyzed. Then, after reading the file, two alphabetized lists of variables are printed on the screen. The first list gives all of the numeric variables' names, the second list gives all the string variables' names. Provision is made to allow processing of several files, combining the results into one list. The files do not have to be sequential but operator input is required for each one as they are processed. Listing of files as they are processed is optional.

```
NUMERIC VARIABLES

A            A1           B            B1
C            D            E            F
F2           G            H1           I
I3           J            K            N
O            Q            P1           P2
Q            S            S1           S2
W            T1           T2           U
X3           X4           X0           X2
Y0           Y2           Y3           Y4
Y5           Z            Z2

STRING VARIABLES

A$           D$           E$           G$
M$           P$           U$           W$
X$           Y$           Z$
```

Program 6

Title: **Cross-Reference & List Program Variables**

Author: Dan Taylor
        Tektronix, Inc.
        Wilsonville, OR

Memory Requirement: 16K
Peripherals: Optional-4641 Printer
Statements: 192
Files: 1 ASCII Program

This program reads a BASIC ASCII program from tape and produces an alphabetized table of the variables used in the program. It also produces a cross-reference for each variable used which shows the BASIC line numbers where that variable is used and indicates if a value is assigned to that variable in that line of code. The BASIC program may be stored on multiple sequential tape files. Three variables must be changed to output to 4641 Printer.

```
VARIABLES:

A
   23 1060    23 1260 *   23 1460    23 1630    23 1710    23 1710
   23 2520    23 2550     23 2620    23 2730 *
A$
   23 1080    23 2080 *   23 2160 *  23 2230    23 2230    23 2240
   23 2240    23 2290 *   23 2390 *  23 2460    23 2790 *  23 2880 *
B$
   23 1080    23 2090 *   23 2120    23 2170 *  23 2210    23 2210
   23 2250    23 2280     23 2330 *  23 2370    23 2410 *  23 2830 *
   23 2880    23 2890
C$
   23 1080    23 1740 *   23 1830    23 2200 *  23 2220    23 2220
   23 2270    23 2270     23 2290    23 2290    23 2360    23 2370
   23 2790    23 2890
F
   23 1290 *  23 1300     23 1310    23 1320    23 1390    23 2680
   23 2700    23 2760
F0
   23 1090    23 1100     23 2670
F1
   23 1170 *  23 1180     23 1180    23 1180    23 1290
F2
   23 1200 *  23 1210     23 1210    23 1210    23 1290
F3
   23 1700 *  23 1750 *   23 1750    23 1760    23 1770 *
F4
   23 1030    23 1760
F5
   23 1040 *  23 1580     23 1800    23 1890
F6
   23 1580 *  23 1650
F7
   23 1590 *  23 1650     23 1670 *  23 1690 *  23 1690    23 1790 *
   23 1790    23 1800     23 1820    23 1880 *  23 1880    23 1890
   23 1910 *
```

```
VARIABLES:

A                                                             A$
                                                              B$
                                                              C$
F    F0  F1  F2  F3  F4  F5  F6  F7                            F$
                                                              G$
                                                              H$
                                                              I$
J    J0  J1  J2  J3  J4  J5  J6  J7  J8  J9                    J$
                                                              K$
                                                              L$
N                                                             N$

                                                              R$
                                                              S$
                                                              T$

                                                              V$
                                                              W$
```

Program 7

Title: **Device Address Adding Program**

Author: Jan Broenink
        Tektronix International Inc.
        European Marketing Centre
        Amstelveen, Holland

Memory Requirement: 16K
Peripherals: 4924 Tape Drive
          Optional-4641/4642 Printer
Statements: 402
Files: 1 ASCII Program

The program reads a tape file from the 4924 containing a 4050 BASIC program in ASCII format and updates the program by adding a device address (for graphics and alphanumerics) to output statements without a device address or with address 32 (without a secondary address) and saves the updated file to the tape in the internal tape drive.

The program searches for the following output statements without a device address or with address 32:

PRINT	MOVE
LIST	DRAW
RMOVE	AXIS
RDRAW	GIN

and will automatically or with user interaction add a device address. Interaction allows the user to define more than one output address within a program. For instance, user instructions may be directed to the screen while graphs may be directed to the plotter.

If APPEND, OLD, and FIND's are used in a program, a message is given how many APPEND's, etc., have been traced. In some cases the user has to check the result if the new program is still usable in relation with other program(s) or routine(s).

A routine is added to the original program to define a device address for graphic and alphanumeric output. An unused User Definable Key in the original program may be used to call this routine.

The original program may be stored on several sequential tape files.

```
##############################################
    TRANSFER OF FILE : 1 TO FILE : 1
##############################################

### WARNING ###
       FILE # 1 CONTAINS :
    1 OLD's
    1 FIND's
### CHECK THE RESULT ###

WHICH VARIABLE DO YOU WANT TO USE AS ADDRESS FOR GRAPHIC-OUTPUT
DEFAULT : Q9     YOUR VARIABLE :

WHICH VARIABLE DO YOU WANT TO USE AS ADDRESS FOR PRINTER-OUTPUT
DEFAULT : Z9     YOUR VARIABLE :
### UDK # 1 IN NEW PROGRAM WILL BE USED TO SELECT
   OUTPUT-DEVICE(S).
NEW FILE 1: LINE 110 CONTAINS @32 WITH SECONDARY ADDRESS.
THE STATEMENTS IS :
110 PRINT @32,26;0
THIS IS NOT CHANGED IN THE NEW PROGRAM.
NEW FILE 1: LINE 270 CONTAINS @32 WITH SECONDARY ADDRESS.
THE STATEMENTS IS :
270 PRINT @32,20;0,00,0,90,0,90,0,90,0,100,0,100
THIS IS NOT CHANGED IN THE NEW PROGRAM.
NEW FILE 1: LINE 200 CONTAINS @32 WITH SECONDARY ADDRESS.
THE STATEMENTS IS :
200 PRINT @32,21;15,70
THIS IS NOT CHANGED IN THE NEW PROGRAM.
   ## STATEMENT # 290
290 PRINT 'USINESS'
   WHICH DEVICE (Graphics/Alpha-num./Screen) ? S
```

Program 8

Title: **Log/Linear Axis Labeling Routine**

Author: Steven Den Beste
        Tektronix, Inc.
        Wilsonville, OR

Memory Requirement: 16K
Statements: 281
Files: 1 ASCII Program

This program is a subroutine designed to be used with a user program. The subroutine generates an L-shaped axis with logarithmic or linear labeling on either axis, covering any range of positive values, and placed anywhere on the screen.

All labels are 4 characters, including a decimal point and a sign (if negative).

A pair of transformation functions are defined by the user before generating the plot.
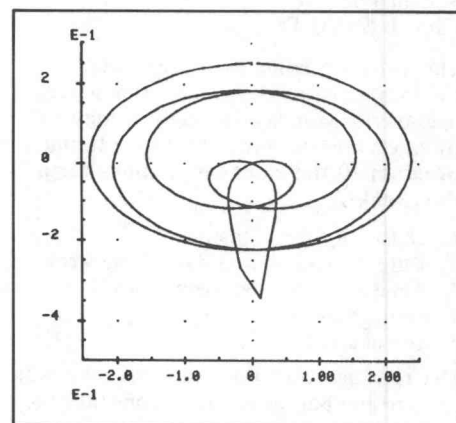
Program 9

Title: **Dashed Lines**
Author: Bob Ross
        Tektronix, Inc.
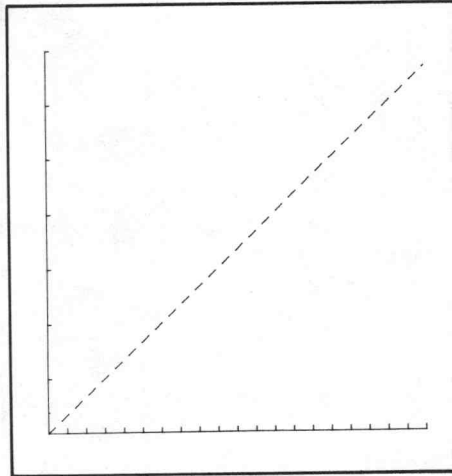   Wilsonville, OR
Memory Requirement: 8K
Peripherals: Optional-4662 Plotter
Statements: 154
Files: 1 ASCII Program

Three subroutines draw dashed lines for:

1. A Y array with X values stepped linearly from a starting to an ending value;
2. Points stored in X and Y arrays;
3. A sequence of X and Y values.

The dashes are a constant length regardless of the viewport and window chosen. The dash length and ratio of dash to dash plus space are selectable. The line can start and end on a full dash or full space.

Program 10

Title: **Calendar Routines (7-Day Week)**
Author: Judy Peterman

        Tektronix, Inc.
        Wilsonville, OR
Memory Requirement: 8K
Statements: 200
Files: 1 ASCII Program

This program contains five calendar utility routines based on a seven-day week. Sunday through Saturday. They have been designed specifically for use in programs that calculate and graph financial and other business data, but can be used in any program that involves the collection or display of time related data. The routines:

1. Gives the date a specific number of time segments before or after a specific date.
2. Gives day number, week number, and day of the week of a specific date based on January 1, 1900.
3. Gives the number of time segments between two specific dates.
4. Verifies a date entry.
5. Unpacks a date.

All routines accommodate five time frames: days, weeks, months, quarters, and years. For example, if you are using days as the time segment in routine #1, 11/17/74 +2 yields 11/19/74; in weeks 11/17/74 +2 yields 12/1/74. The routines will not produce results prior to January 1, 1901.

The routine package comes with examples. Routines and examples require 7.9k bytes to run; the routines alone require 5.3k bytes.

Program 11

Title: **Calendar Routines (5-Day Week)**
Author: Judy Peterman
        Tektronix, Inc.
        Wilsonville, OR
Memory Requirement: 8K
Statements: 210
Files: 1 ASCII Program

This program contains five calendar utility routines based on the premise that a week is five days, Monday through Friday. The routines are the same as those found in program 10 the calendar routines for a 7-day week:

1. Date   n time segments,
2. Date #, week #, and day of the week,
3. Time segments, between dates,
4. Date entry verify, and
5. Unpack date.

The routines with the examples take 8.3k bytes to run but the routines alone take only 5.6k bytes.

Program 12

Title: **FORTRAN to BASIC Converter**
Author: Mark R. Mehall
      Tektronix, Inc.
      Wilsonville, OR
Memory Requirement: 32K
Peripherals: 4924 Digital Tape Drive
              4050R06 EDITOR ROM

Statements: 977

Files: 2 ASCII Program
      Requires separate tape

This program is designed to convert FOR-
TRAN to 4050 Series BASIC. The program
is based on the USA Standard FORTRAN,
X3.9-1966. The FORTRAN statement
labels, variables and subroutine names are
changed to their BASIC counterparts and
remembered for references throughout the
program. The majority of FORTRAN
statements are changed into BASIC by this
program. The statements that are not direct-
ly compatible are made into REMARK's
and can be modified using the EDITOR
ROM or the 4050 Series Line Editor. The
FORTRAN statements: READ, WRITE,
FORMAT, IF, GO TO, DO, DIMENSION,
CALL, END, RETURN, STOP,
SUBROUTINE, and CONTINUE are
automatically changed to BASIC. The FOR-
TRAN internal routines are also converted
to the corresponding BASIC routines.

The program also prints tables of correspon-
ding FORTRAN statement numbers to
BASIC line numbers, FORTRAN variable
names to BASIC variables, and FORTRAN
subroutine names to BASIC Line numbers.

```
LIST
      I=0
      S=3.141593
   :1 ROOT=1.7
      ROOT=(ROOT##2+S)/(2.0#ROOT)
      I=I+1
      TEST=ROOT##2-S
      IF (TEST) 8,5,9
   :5 FORMAT(' PI##.5= ',F8.6/'0',I4,' ITERATIONS')
      WRITE(3,4) ROOT,I
      STOP
   :8 TEST=-1.0#TEST
   :9 IF (TEST-.000005) 5,5,1
      END
LIST
  100 I=0
  110 S=3.141593
  120 R0=1.7
  130 R0=(R0#2+S)/(2.0#R0)
  140 I=I+1
  150 T0=R0#2-S
  160 GO TO SGN (T0)+2 OF  200,100,210
  170 IMAGE ' PI##.5= ';1D.6D/'0',4D,' ITERATIONS'
  180 PRINT USING 170: R0,I
  190 STOP
  200 T0=-1.0#T0
  210 GO TO SGN (T0-.000005)+2 OF  100,100,130
  220 END
```

Program 13

Title: **Flow Diagrammer (tape)**
Author: Keith S. Reid-Green
      Educational Testing Service
      Princeton, NJ
Memory Requirement: 16K
Peripherals: 4662 Plotter
Statements: 917
Files: 5 ASCII Program
      Requires dedicated tape

The program is used to design, store, recall
and modify flow diagrams for use in
program and system documentation.

A diagram consists of a heading, 10 different
box types, their connecting lines and label-
ing. Boxes and lines may be solid or dotted
and may be arranged up to 4 across and 9
deep on a page.

The program consists of 5 phases:

1. Main menu and function keys
2. Enter boxes
3. Connect, insert, delete boxes
4. Enter box data and heading
5. Store or retrieve diagrams

The first 62 files of a tape must be dedicated
to this program. Files 1 through 5 contain the
program; files 6 through 42 contain informa-
tion about the current diagram; and files 43
through 62 store up to 20 diagrams.

Program 14

Title: **Flow Diagrammer (disk)**
Author: Keith S. Reid-Green
      Educational Testing Service
      Princeton, NJ
Revised by: L.C. Sheppard
          Sheppard Software Co.
          Sunnyvale, CA
Memory Requirement: 32K
Peripherals: 4662 Plotter
            4907 File Manager

Statements: 923
Files: 1 Program
      Requires dedicated data disk

The program is used to design, store, re-
call and modifiy flow diagrams for use in
program and system documentation.

A diagram consists of a heading, 10 dif-
ferent box types, their connecting lines
and labeling. Boxes and lines may be
solid or dotted and may be arranged up
to 4 across and 9 deep on a page.

The program consists of 6 phases:

1. Create data disk
2. Main menu
3. Enter boxes
4. Connect, insert, delete boxes
5. Enter box data and heading
6. Store/retrieve/destroy diagrams

A disk will hold 200 diagrams with up to
2000 charcters of ''box data'' per dia-
gram.

Programs 15-16

Title: **Segmented Data Base and**
       Windowing Routines
Author Leslie L. Brabetz
      Tektronix, Inc.
      Wilsonville, OR
Memory Requirement: 32K
Peripherals: Optional-4907 File Manager

Statements: 701
Files: 3 ASCII Program
     2 Binary Data

A series of articles in TEKniques (Vol. 1 No.
10, and Vol. 2 Nos. 1 and 2) described the
theory and operation of creating a segmented
data base from a large serial data base for fast
windowing. Five files included in this program
illustrate the mechanics of carrying out
segmentation and windowing.

One routine allows definition of rectangular
data windows. A master file may be read in and
the vectors which begin and end or intersect the
data window are stored in a segment file. The
coordinates of intersection with the boundaries
are calculated and stored in the segment file.
The master data file must be in the form of
arrays, with the number of coordinate pairs, N,
followed by the coordinate arrays, X, Y.

$N, X_1, X_2, \ldots, X_n Y_1, Y_2, \ldots, Y_n$
Output segment files are created with the same
format. To apply this routine to a user's data
will require some revision of the program I/O
and segment definition.

A small routine is included which generates the
two data files. A third routine similar to the
first is included. However, it directs the output
to the display rather than a segment file and
input files are read from the tape rather than the
disk.

PROGRAMMING AIDS T2
062-5972-01

PROGRAMMING AIDS T2 is a tape collection of 15 programs PLUS the Programming Tips handbook to aid you in creating or dissecting a 4050 BASIC program. Employ these routines to follow a program's structure, track variables or change them, enhance graphs. Take a look at the abstract describing the novel program which converts bases (Hexadecimal Operations). The Programming Tips handbook has been a best seller and is sure to expand and streamline your 4050 operations. The individual abstracts describe each program.

Title/
Previous Abstract #

Flowchart Program for 4051 Basic Programs
51/00-8005/1

Automatic Tape Directory
51/00-8022/0

Tape File Header Expander
51/00-8039/0

List Program's Statement Types
51/00-8001/0

Sort & List Program Variables
51/00-8003/0

Change and List Program Variables
51/00-8028/0

Variable Name Changer
51/07-8034/0

Program Module Cross Reference
51/00-8027/0

Program Module Map
51/00-8027/0

Dash, Dot, Dash-Dot Routine
51/00-9501/0

Neat Tics and Axis Labeling
51/00-9502/0

Linear Axis Labeling Routine
51/00-9503/0

Hexadecimal Program
51/00-5503/0

Disk Directory
51/07-8049/0

File Identifier
51/07-8031/0

Programming Tips Handbook, Vol. 1
51/00-7004/0

Program 1

Title: **Flowchart Program for 4051 Basic Programs**
Author: Han Klinkspoor
Tektronix, Inc.
Amstelveen, The Netherlands
Revised by Leland C. Sheppard
Sunnyvale, CA
Memory Requirement: 9K for the program; will run on 16K machine and chart programs with up to 170 branches. On 24K or 32K machines, it will chart programs with 700 or more branches.
Statements: 405
Files: 1 ASCII Program

This program will flowchart any 4050 BASIC program from a tape file. It does the job in the following way:

In the first pass, a map of the branches is made to enable "look ahead" in the second pass. In the second pass, program lines are processed one at a time. The line number is stripped off and the branch table is examined to draw incoming or outgoing branches, if any. As each entry in the branch table is processed, the page number on which that reference occurred is plugged back into the branch table for subsequent printing. As the program is charted the current page number and the starting and ending statement numbers shown on that page are printed on the bottom of the page.

Restrictions: Limit of 4 character statement numbers to allow the program to run on a

16K machine. This may be modified to 5. Maximum of 20 FOR/NEXT loops unless modified to increase the limit. Page limit is 99 but may be modified.
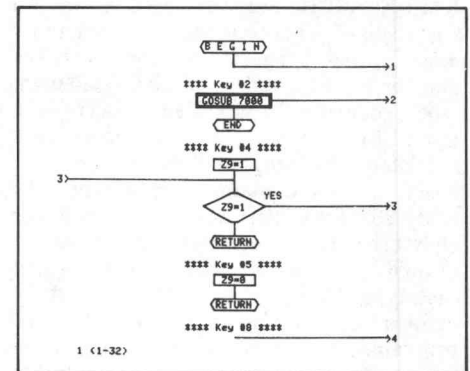
Program 2

Title: **Automatic Tape Directory**
Author: E.A. Bleiweiss
University of New Mexico
Civil Engineering Research
Albuquerque, NM
Memory Requirement: 24K
Statements: 150
Files: 1 ASCII Program
Requires 1 data file

The program will list in order the contents of a magnetic tape cartridge by file number, size, type (ASCII or BINARY) and contents (title of Program). It will then load and run a selected program if requested.

The program requires the first 2 files on the tape. File 1 is for the program; file 2 for the data (Table of Contents).

When used for the first time the program will scan each file starting with file 3, then read and list the first line of each file. The first line of each program must be a REM statement and contain the title in braces [ ]. Up to 48 characters may be used in the title.

The maximum title storage capability in file 2 is 43 files. If more are required, file 2 may be marked larger and the appropriate lines of code changed in the program.

Program 3

Title: **Tape File Header Expander**
Author: Randy Bowling
        Tennessee Valley Authority
        Chattanooga, TN
Memory Requirement: 8K

Statements: 197
Files: 1 ASCII Program

This program permits you to annotate the standard file header as well as add information in the remaining 256-byte header block not occupied by the standard header.

A descriptively annotated file allows quick identification during the normal TLIS. The expanded header would only be displayed using the expanded TLIS portion of this program.

The annotations of the standard header or its expansion does not affect the data contained in any tape file. The file may contain a program or data in ASCII or binary. Programs may be secret or open.

```
 1   ASCII   PROG    2304  MANNING'S EQUATION DEPTH FLOW
 2   ASCII   PROG   13056  BABY ANNOUNCEMENT CARD
 3   ASCII   PROG    5120  MC6800 DISASSEMBLER PROGRAM
 4   ASCII   DATA     768  MC6800 DISASSEMBLER DATA
 5   ASCII   PROG    6400  QUANTEX DS-12 INTERFACE
 6   BINARY  PROG   20224  MASS STORAGE MANAGEMENT SYSTEM
 7   ASCII   PROG    6144  4924 MASS TAPE DUPLICATION
 8   ASCII   PROG    2560  PROGRAM MODULE CROSS REF & MAP
 9   ASCII   PROG    3840  PROGRAM MODULE CROSS REF & MAP
10   ASCII   PROG    1536  GPIB GET COMMAND TRIGGER HP3438A
11   ASCII   PROG    4096  GPIB GET COMMAND TRIGGER ICS4880
12   ASCII   PROG    2816  FILE IDENTIFIER
13   ASCII   PROG   19968  SLIDEMAKER II (REVISION) PROGRAM
14   ASCII   DATA    5632  SLIDEMAKER II (REVISION) DATA
15   ASCII   PROG    3072  SLIDEMAKER II (REVISION) CONVERT
16   ASCII   PROG   21248  Q-PLOT
17   ASCII   PROG    7424  SYMBOLGEN
18   LAST             768

Please press the RETURN key when you are ready to continue.
```

Program 4

Title: **List Program's Statement Types**
Author: Brian Diehm
        Tektronix, Inc.
        Wilsonville, OR
Memory Requirement: 8K
Statements: 113
Files: 1 ASCII Program

This program reads a tape file containing a BASIC ASCII program and prints an alphabetized list of all the statement types used in that program, together with the number of occurrences of each statement type. Then the list is sorted in decreasing order by number of occurrences and reprinted. The program first asks the user which tape file contains the program to be analyzed. Then after reading the file, the alphabetized list of statement types is printed, with the count of the occurrences of each type. This is followed by a total of the number of statements in the analyzed program. Provision is made to allow processing of several files, combining the results into one list.

```
STATEMENT TYPES USED (USE ORDER):

LET(IMPLIED)    41
IF              19
PRINT           15
REM             10
FOR              5
NEXT             5
GO TO            4
INPUT            4
PAGE             3
FIND             2
DIM              1
END              1
GOSUB            1
ON               1
RETURN           1

TOTAL NUMBER OF STATEMENTS: 113
```

```
STATEMENT TYPES USED (ALPHABETICALLY):

DIM              1
END              1
FIND             2
FOR              5
GO TO            4
GOSUB            1
IF              19
INPUT            4
LET(IMPLIED)    41
NEXT             5
ON               1
PAGE             3
PRINT           15
REM             10
RETURN           1

TOTAL NUMBER OF STATEMENTS: 113
Press RETURN to continue.
```

Program 5

Title: **Sort & List Program Variables**
Author: Dan Taylor
        Tektronix, Inc.
        Wilsonville, OR
Memory Requirement: 8K
Statements: 118
Files: 1 ASCII Program

This program reads a BASIC ASCII program from tape and produces an alphabetized table of the variables used in that program. The BASIC program may be stored on multiple tape files as long as the files are sequential on tape. No operator intervention is required between first and last files.

```
VARIABLES:

A    A$
     B$
     C$

F    F$   F0   F1   F2   F3   F4   F5   F6   F7
     G$
     H$
     I$
J    J$   J0   J1   J2   J3   J4   J5   J6   J7   J8   J9
     K$
     L$

N    N$


     R$
     S$
     T$

     V$
     W$
```

Program 6

Title: **Change and List Program Variables**
Author: S. Schicktanz
        Technical University
        Munich, Germany
Memory Requirement: 8K
Statements: 143
Files: 1 ASCII Program

The program allows listing or changing the names of the variables of an ASCII program from tape. Listing the program is also available. When changing variable names, input is tested for validity and correct type; errors are indicated by an appropriate message. The changed program can then be output to the original or another tape file.

The program can be used either with the menu or the User-Definable Keys. The user is prompted for necessary input information by use of the POInter-statement. It is not necessary to terminate input with the RETURN key.

User-Definable Keys provide:

    Menu
    Program input
    Variable list
    Variable change
    Program list
    Program output

```
LIST OF VARIABLES:

A,
A$,
B,
B$,
C,
C$,
D, D0, D1, D2,
E, E0,
F, F1,
G, G1,
H,
I,
K,
L, L0,
M, M0,
N,
N$,
O,
P,
Q,
R, R0,
S,
T,
U,
V,
Y,
Z1,

O-output new program
N-new start
V-list variables
P- program
C-change variables

Variable to be changed: I; New name: K0
Variable to be changed: G
invalid name! ; C; New name: C1
Variable to be changed: D4; New name: F$; wrong type!
Variable to be changed: D$; New name: F$
Variable to be changed: N$; New name: PR
invalid name ! ; P$
Variable to be changed:
```

Program 7

Title: **Variable Name Changer**
Author: Mallory M. Green
        U.S. Dept. of HUD
        Washington, D.C.
Memory Requirement: 8K
Peripherals: 4907 File Manager
Statements: 167
Files: 1 ASCII Program

Variable Name Changer allows a programmer to change any number of variable names in his program with ease. The program to be changed must be an ASCII file on tape in the 4050 internal tape drive. **Variable names in REMark statements are not changed.** The revised program is written as an ASCII file on the 4907 disk, leaving the original program intact on tape.

Variable Name Changer prompts the user for a list of current variables to be changed and for their new names; it then prompts for the file number of the program to be revised. The file is read a statement at a time. If it is not a REMark or IMAge statement, it is scanned character by character for variables. When a variable to be changed is discovered, it is replaced with the new variable name. The process continues until the whole program has been read from tape and written to disk

```
ENTER VARIABLE NAME CHANGES DESIRED

PRESS 'RETURN' FOR 'OLD NAME' TO EXIT

OLD VARIABLE NAME                NEW VARIABLE NAME
*****************                *****************
OLD = X                          NEW = X1
OLD = Y                          NEW = Y1
OLD = X1                         NEW = X2
OLD = Y1                         NEW = Y2
OLD = L$                         NEW = Z$
OLD =

ENTER INPUT TAPE FILE # OR '0' TO STOP? 17

ENTER OUTPUT ASCII DISK FILE NAME? TEST/PAT

FILE 17 FINISHED

ENTER INPUT TAPE FILE # OR '0' TO STOP? 0
TO LOAD YOUR MODIFIED FILES INTO MEMORY
USE THE FOLLOWING COMMAND TYPE:

***** OLD "TEST/PAT","ASCII" *****

CONVERSION FINISHED
```

Programs 8-9

Title: **Program Module Cross Reference and Map**
Author: Captain S.K. Sanford
        Aberdeen Proving Ground, MD
Memory Requirement: 16K
Peripherals: Optional-4051R06 Editor
                ROM Pack
                4924 Tape Drive
Statements: 276
Files: 2 ASCII Program
      Requires user-created data files

The cross reference program requires that the user create two files of calling and called subprogram names using the 4051R06 Editor ROM or a simple BASIC program. The first file must be sorted in calling program sequence (alphabetically), while the second, which is identical, must be sorted in called program sequence.

The program reads the created data files from the 4050 or a 4924 one at a time and produces a listing of the calling programs with their called programs, then a listing of the called programs with their calling programs. The pages of output are numbered alphabetically from "a" to "zz", and may be automatically copied by the 4631.

The module map program requires a file on tape showing the calling and called module names, and their interrelationships. The program searches the tape for all occurrences of a calling program and records the called program modules. In order for a program to appear on the module map, it must be called by another program, with the exception of the "MAIN" program and an optional "BLOCK DATA" program for use with FORTRAN program systems.

The map appears as multiple pages on the 4050 and may be automatically copied. Each page is headed by one program. The programs called by this first program are displayed in blocks linked by arrows to the first block. From each called program block is an arrowhead and the number of the page on which that program appears.

```
*** MODULE CROSSREFERENCE ***

MODULE ADDALI CALLS MODULE(S):
           BEPUT
           NEWV
           PGPAGC
           RESTOV
           SAVEV
           UPALI
           VACCES

MODULE ADDSUB CALLS MODULE(S):
           CONSOL
           MXTGEN
           RESTOV
           SAVEV
           SUBCH
           UPALI
           VACCES

MODULE ADDSUP CALLS MODULE(S):
           CONSOL
           MXTGEN
           RESTOV
           SAVEV
           SUBCH
           UPALI
           VACCES

MODULE BELLS  CALLS MODULE(S):
           DRBELL

       *** MODULE MAP ***          CHART 01
```
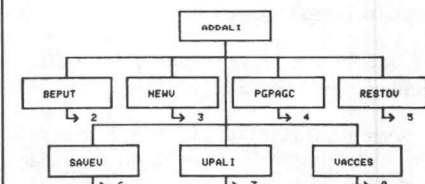
Program 10

Title: **Dash, Dot, Dash-Dot Routine**
Author: Nick Fkiaras
Tektronix, Inc.
Wilsonville, OR
Memory Requirement: 8K
Peripherals: Optional-4662 Plotter
Statements: 151
Files: 1 ASCII Program

The program draws a solid, dotted, dashed, or dot-dashed line between any two points X1,Y1, and X2,Y2 regardless of the window and viewport used. User inputs X and Y coordinate points, viewport, window, line type and output device. User-Definable Keys enable the user to:

Enter data and draw
Redraw with a different line type
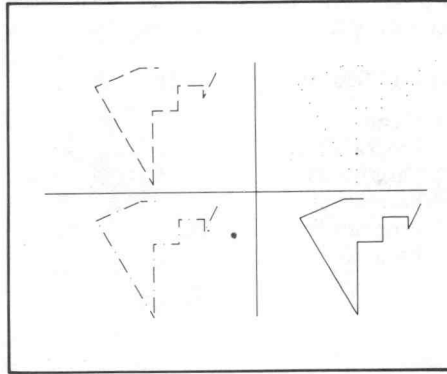
Program 11

Title: **Neat Tics and Axis Labeling**
Author: Dan Taylor, Kathy Thurman
Tektronix, Inc.
Wilsonville, OR
Memory Requirement: 8K
Statements: 78
Files: 1 ASCII Program

This program is a subroutine designed to be used with a user program. The subroutine prepares the screen for a user's graph by:

1. Calculating "neat" tic lengths

2. Setting the WINDOW

3. Setting the VIEWPORT

4. Drawing an axis and labeling the tic marks. The axis is drawn through user data value 0 (or data min if 0 is not in the WINDOW). Tic labels always appear to the left and bottom of the screen.

Tic marks on the axes are presumed to be evenly spaced (not logarithmic).

Requires minimum and maximum data values and number of tic intervals desired on each axis. Labels are printed in scientific notation for either axis if any label on that axis = 10.

The viewport allows room on the screen for a title to be printed above the graph.
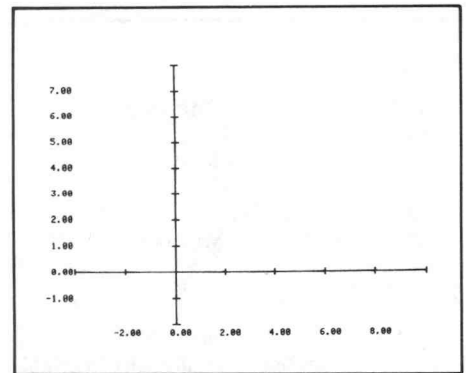
Program 12

Title: **Linear Axis Labeling Routine**
Author: Steven Den Beste
Tektronix, Inc.
Wilsonville, OR
Memory Requirement: 8K
Statements: 196
Files: 1 ASCII Program

This program is a subroutine designed to be used with a user program. The subroutine generates an L-shaped axis, with tics and labels, covering any plot range, and places it anywhere on the screen. It requires 10 input variables and passes back 8 of them to describe the plot exactly.
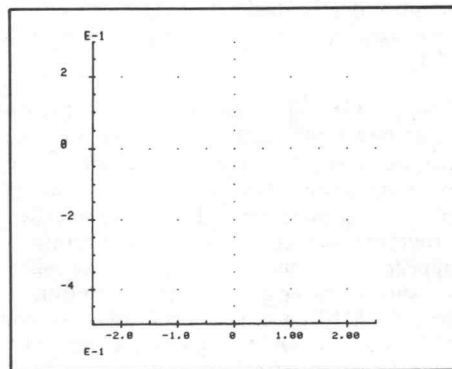
All labels are 4 characters, including a decimal point and a sign (if negative).

For orientation, a grid of points is generated within the plottable areas. A point is placed at the intersection of any two intersections and at the intersection of any tic and zero, if zero is within range. (This is optional.)

An example program is included.

Program 13

Title: **Hexadecimal Program**
Author: Marv Abe
       Tektronix, Inc.
       Wilsonville, OR
Memory Requirement: 16K
Statements: 360
Files: 1 ASCII Program

This routine allows the user to perform some miscellaneous hexadecimal functions using the 4050 System. Each one of the routines provided are called by the User-Definable Keys.

Conversion routines provided are:

1. Decimal Values—Hex Representation
2. Hexadecimal Values—Decimal Representation
3. RAD40—ASCII*
4. ASCII—RAD40 Representation*
5. Hexadecimal #—Bit Pattern
   *NOTE: For TEKTRONIX 4081

Arithmetic functions provided are:

1. Hexadecimal Subtraction
2. Hexadecimal Addition

Both functions are provided in cumulative form and add and subtract from some constant value. The different routines prompt the user for the required input and most always terminate on a carriage return.

Program 14

Title: **Disk Directory**
Author: Nick Ogbourne
       Comalco Aluminium (Bell Bay)
Ltd.
       George Town, Tasmania
Memory Requirement: 8K
Peripherals: 4907 File Manager
Statements: 193
Files: 1 ASCII Program

Disk Directory maintains a directory of up to 50 disk programs and controls access to and execution of those programs.

Disk Directory creates and maintains an index file. This index file includes the file identifier, program # (sequenced in the order entered), and user-input information (up to 44 characters) about the file. Programs may be added or deleted through the User-Definable Keys.

Disk Directory reads the index file, prints a directory of the files (multipage if necessary) and prompts for the program of your choice. It will warn you if a selected file is a binary data file. Any other type of file it will attempt to load.

Program 15

Title: **File Identifier**
Author: Nick Ogbourne
       Comalco Aluminum Ltd.
       George Town, Tasmania,
       Australia
Memory Requirement: 8K
Peripherals: 4907 File Manager
Statements: 111
Files: 1 ASCII Program

The program is a subroutine to compile a file identifier that will comply with the 4907 File Manager rules.

The program prompts the user to select libraries to the selected level, up to level 4, including SYSLIB or SCRATCHLIB. Passwords for any or all libraries may be added.

Following library selection, file selection on the same basis occurs, plus the selection of a file extension.

The valid file name is then returned in E$ and a flag, E0, assumes a value of 0 if the file does not exist and 1 if it does exist on the currently mounted disk

```
Level # 1 library.Maximum 10 characters.
Press <RETURN> for SCRATCHLIB,enter '#' for SYSLIB.
Enter name for USERLIB.
USERLIB
Password.Maximum 10 characters.Press <RETURN> if not required.
LIBPASS
Level # 2 library.Maximum 10 characters.
Enter '/' to select file. LEVEL2
Password.Maximum 10 characters.Press <RETURN> if not required.

Level # 3 library.Maximum 10 characters.
Enter '/' to select file. /
File name.(Maximum 10 characters.) = FILENAME
Password.Maximum 10 characters.Press <RETURN> if not required.
FILEPASS
Extension.Maximum 4 characters.Press <RETURN> if not required.
EXTE
FILE = @USERLIB:LIBPASS/LEVEL2/FILENAME:FILEPASS.EXTE FLAG = 0
```

Program 16

Title: **Programming Tips Handbook,
     Vol. 1**
Author: Applications Library Members
Documentation Only

The PROGRAMMING Tip Handbook is a collection of all of the Programming Tips and BASIC Bits from the first three volumes of TEKniques (1977—1979), published as one volume. Corrections from issues subsequent to the tip are incorporated into the handbook in the text of the tip. In this way, all of the Programming Tips and BASIC Bits from these issues can be found in one place. And the Programming Tips Handbook is well indexed to find the desired tip easily. For instance, information can be found by programming area, rather than by title or TEKniques issue alone.

PROJECT AIDS T1
062-5985-01

Maintain budget, schedule activities, do "what if" modeling or track costs with the many programs contained on this tape. The individual abstracts describe each program.

Three of the programs must be transferred to their own dedicated tapes. The documentation contains explicit instructions for accomplishing the transfers.

Title/
Previous Abstract #

Business Simulation
51/00-0718/0

Inventory/Production Modeling I
51/00-0501/0

MIPS — A Management Information Processing System
51/00-0716/0

Time Lapse Analysis
51/00-0714/0

Project Hours Data Maintenance
51/00-0100/0

Engineering Expenses Data Maintenance
51/00-0101/0

Average Elasticity of Demand
51/00-0301/0

Sales Commission Projection
51/00-0801/0

Depreciation
51/00-0719/0

Machinery Cost Analysis
51/00-0720/0

Capital Budget
51/00-0103/0

Gantt Chart
51/07-0102/0

Project-Schedule Chart
51/00-0104/0

Program 1

Title: **Business Simulation**
Author: Gene Lynch
      Tektronix, Inc.
      Wilsonville, OR
Memory Requirement: 32K
Peripherals: Optional-4051R05 Binary
           ROM Pack
Statements: 1101
Files: 5 ASCII Program
     1 Binary Program

The program simulates a manufacturing firm. The effects of employee attrition, equipment failure, age of product, scheduling, finance, inventory, advertising, pricing, planned growth, research and development, inflation, overhead, hiring, firing, and training are included in the simulation.

The user has complete control of the operation of the company. The program supplies operational information and status reports from which the user must decide to: hire or fire people, increase or decrease advertising and R&D budgets, order parts and equipment, set production schedules and prices, and pay off outstanding notes.

Operation begins in March of manufacturing year 1 with no outstanding debts, $600,000 in liquid investments, 1 plant (20-machine capacity), 10 machines, 50 general employees, and 20 sales people. The current price for parts-per-unit is $100. The program produces graphic reports as well as initial "consultant's reports."

The simulation of a business, division or process is a powerful tool for understanding its behavior and in determining appropriate actions.

Program 2

Title: Inventory/Production Modeling I

Author: Dennis R. Heckman
        Tektronix, Inc.
        Wilsonville, OR

Memory Requirement: 16K
Peripherals: Optional-4662 Plotter
                4641 Printer

Statements: 333
Files: 1 ASCII Program

This program is designed to naively represent a Manufacturing Operation producing one product. It demonstrates the advantage of run-time graphics in modeling. As inputs the program requires:

Ratios and Constants

An average production rate per worker
Total facility capacity
Desired backlog time
An average material waste ratio
An average lost order rate
Desired inventory risk factor

Initial Settings

Initial inventory
Initial order backlog
Initial production
Initial shipments

Order Entry

The number of iterations
The initial order level either
The growth rate or
The iteration number for a step change
The amount of the change

A series of equations are then used to model the various relationships while the order quantities are derived from a random number generator. The Work Force and Materials Inventory required for production at each iteration may be output.

You may change ratios, orders or settings by pressing the appropriate User-Definable Key.

Users may wish to make changes to the model/program for their own purposes. In the areas of material delays, variable reject rates for parts, work force turnover and learning curves for new hires, considerable improvements can be made.

Inventory/Production Modeling

Time	Prod	Ship	Inv	Orders	Backlog	Demand	Mat	W/F
0	100	0	100	100	100	85	111	20
1	90	85	105	104	104	-17	100	18
2	81	83	98	112	112	-3	90	17
3	73	95	76	116	116	22	81	15
4	66	98	44	109	109	48	73	14
5	59	92	11	128	128	97	66	12
6	65	76	0	123	155	131	72	13
7	71	71	0	121	181	153	79	15
8	78	78	0	143	218	185	87	16
9	86	86	0	132	231	196	96	18
10	95	95	0	150	251	213	106	19
11	104	104	0	150	259	220	116	21
12	114	114	0	162	260	227	127	23
13	125	125	0	152	254	215	139	25
14	137	137	0	174	252	214	152	27
15	151	151	0	163	226	192	160	31
16	166	166	0	177	203	172	184	34
17	172	172	0	181	181	153	191	35
18	155	153	2	186	186	156	172	31
19	156	150	0	188	188	153	173	32
20	153	153	0	198	198	160	170	31
21	168	168	0	190	190	168	187	34
22	168	168	0	207	207	175	187	34
23	175	175	0	209	209	197	194	35
24	177	177	0	212	212	180	197	36
25	180	180	0	214	214	181	200	36

Demand Graph
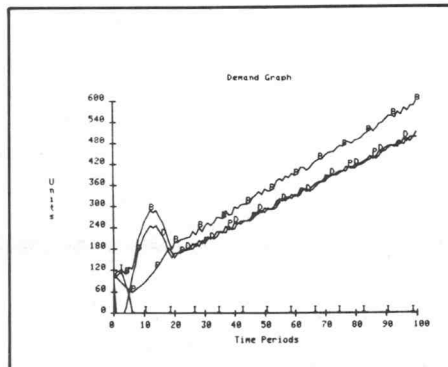
Program 3

Title: MIPS—A Management Information Processing System

Author: Revised by Ed Mitchell
        Tektronix, Inc.
        Wilsonville, OR

Memory Requirement: 32K
Peripherals: Optional-4051R05 Binary
                ROM Pack

Statements: 905
Files: 1 ASCII Program
      Requires a dedicated data tape

This program maintains a data base from which it produces tabular and graphic comparison reports. The data structure provides for 80 files on a data tape, with 14 subfiles in each. The subfiles each have space for 13 entries representing 13 accounting periods in a fiscal year.

The User-Definable Key routines allow easy building and editing of the data, graphing and utility functions:

    Add or change data in a file

    Generate a comparison tabulation and graph

    Generate a comparison tabulation or graph

    Multiple curve graph

    Ratio graph

    Percentage graph

    User-supplied graphing routine

    List file titles on tape

    List subfile titles in the current file

    List data in up to 7 subfiles

    Retrieve a data file from tape

    Save a data file to tape

    Copy this program to tape

    Create a new data tape

    User-supplied utility routine

Tabular or graphic comparison may be made of any two subfiles from one of the 80 major files. In addition, multiple curve graphs may be obtained for up to five curves based on data from any subfiles chosen from any major files.

Notice the automatic generation of different right axis scale when data is disparate.

Ratio or percentage graphs, which use any subfile as the numerator and any subfile as the denominator, are unique features of MIPS.

Newcomers to the 4050 System should be able to manipulate and graph data with ease. A sophisticated user will be able to modify and add code easily to perform special functions.

The program is general purpose and can be used on any type of data (dollars, man-years, percentages, expenses, orders and so on).

MULTIPLE CURVE SUMMARY GRAPH -- YTD RUNNING ACCUMULATION
MYSTERY DISTRICT -- IDG SALES ORGANIZATION
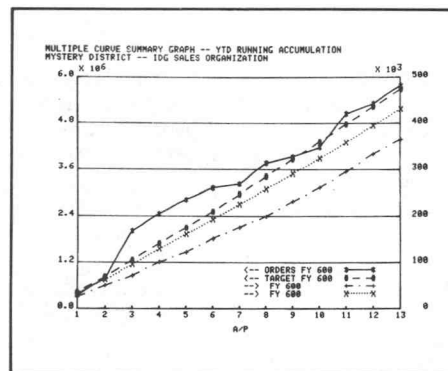
LISTING OF SUBFILE CONTENTS

SUBFILE #	1	2	3	4	5	6	7
F/Y TITLE	600 ORDERS	600 TARGET	600 CUST01	600 CUST02	600 PEOPLE	600 EXPENS	600 BUDGET
1	351234	420000	15000	30000	5	25400	31050
2	451025	420000	10900	2500	5	24600	31060
3	1205412	420000	14520	155000	5	22515	31060
4	456235	420000	17500	24500	5	28415	32540
5	365235	420000	27545	0	6	20100	32540
6	298560	420000	13450	36200	6	30100	32540
7	95865	450000	550	10995	6	25425	32540
8	546213	450000	4595	5000	6	23050	32540
9	156235	450000	15630	0	6	32545	32540
10	254654	450000	25995	5595	6	28790	32540
11	852346	450000	17569	20400	5	33600	35560
12	265845	450000	15655	3995	5	38940	35560
13	476855	450000	14570	5445	6	31030	35560

TITLE FOR FILE # 1 IS :
MYSTERY DISTRICT -- IDG SALES ORGANIZATION

Program 4

Title: **Time Lapse Analysis**
Author: Wendell W. Berry
Memory Requirement: 16K–32K
Statements: 358
Files: 1 ASCll Program
     1 Binary Data (example)
     Requires data tape
     (Files automatically marked)

This program provides a statistical analysis of elapsed time (in days) from one event to another in a particular process, such as invoice processing where specific calendar dates may be assigned to each event. The number of events and the number of samples are limited only by the amount of memory available.

You specify the number of comparisons and which events to compare, e.g., 3 comparisons which are events 1 and 2, events 3 and 5, and events 1 and 5. The program computes the absolute value of the difference in days between these events for all samples. These values are sorted; the frequency of identical elapsed times is the first tabular output. The number of different elapsed times are then computed along with the total usable samples, the mean, standard deviation, median, and mode of the elapsed times. These also are output in tabular form, and a bar graph produced showing the mean elapsed times for all comparisons.

You can gain access to any previously analyzed data for two further options. First, the dates on file for any or all events may be viewed and changes may be made. Secondly, detailed comparisons of two events, date by date, may be made. These options are useful in the explanation of specific data occurrences.

When entering data, you have the option of entering a "0" when a date is missing in the sample. This will be calculated as a "No match" during the comparison routines, and will not enter into the mean calculations, etc. Also included is the option of saving the information entered and computed by the program. This is done to allow later access to data, and is particularly useful in large data samples. The only limitation for data comparison is that the data must be complete. That is, the data must contain three sets of digits separated by a non-numerical character, following the format mo/day/year, where the year is presumed to be in this century and not requiring the entry of the preceding "19".

Program 5

Title: **Project Hours Data Maintenance**
Author: Kathy Thurman
     Tektronix, Inc.
     Wilsonville, OR
Memory Requirement: 24K
Peripherals: Optional—4662 Plotter
Statements: 460
Files: 1 ASCII Program
     Requires a dedicated data tape

This program allows the user to maintain data files containing period and total-to-date hours applied to a project for up to 24 periods. Data may be summarized by period and compared to available hours for the period. Both graphic and tabular output are available and graphic output may be either to the screen or to an X-Y plotter such as the 4662.

The program has seven functions driven by the User-Definable Keys:

1. Enter data and print graph for one project

   Project Title, milestone data (if desired).

   The first time data is entered for a project the user has the option of entering data for prior periods or a beginning total-to-date. Each subsequent time data is entered for the project, the user has the option of modifying the milestone.

2. Change data: title, period hours, total-to-date hours

3. Graph stored data only

4. Summarize hours/period, compare to available hours

5. List of data file numbers and titles

6. Table of period, total-to-date hours

7. Store data on tape

Program 6

Title: **Engineering Expenses Data Maintenance**

Author: Kathy Thurman
Tektronix, Inc.
Wilsonville, OR

Memory Requirement: 16K
Peripherals: Optional-4662 Plotter
Statements: 421
Files: 1 ASCII Program
Requires a dedicated data tape

This program allows the user to maintain data files containing period and total-to-date engineering expense applied to a project for up to 50 periods. Both graphic and tabular output are available and graphic output may be either to the screen or to an X-Y plotter such as the 4662.

The program has seven functions driven by the User-Definable Keys:

1. Enter data and print graph for one project

   Project title, milestone data (if desired).

   The first time data is entered for a project the user has the option of entering data for prior periods or a beginning total-to-date. Each subsequent time data is entered for the project, the user has the option of modifying the milestone.

2. Change data: title, period data amounts, total-to-date data amounts

3. Graph stored data only

4. Graph any 12 periods

5. List of data file numbers and titles

6. Table of period, total-to-date values

7. Store data on tape

Program 7

Title: **Average Elasticity of Demand**

Author: Kathy Thurman
Tektronix, Inc.
Wilsonville, OR

Memory Requirement: 8K
Statements: 39
Files: 1 ASCII Program

This program will calculate average elasticity of demand within price intervals. Maximum revenue occurs at the elasticity index of 1.

The user is asked to input:

1. The number of unit prices to be considered.

2. The prices to be considered and the quantity demanded at each price.

Prices need to be entered in ascending or descending order as the program calculates average elasticity within price intervals. The price interval with an elasticity index nearest to 1 can be broken down into smaller price intervals and the program run again. This may be repeated to determine the exact price that would yield maximum revenue.

The output is in the form of a table showing the quantity demanded and elasticity index for each price interval.

Program 8

Title: **Sales Commission Projection**

Author: Kathy Thurman
Tektronix, Inc.
Wilsonville, OR

Memory Requirement: 8K
Statements: 52
Files: 1 ASCII Program

In response to values for variables input by the user, this program will print a table for the number of months specified (up to 12) showing the following projections:

1. Monthly base salary

2. Monthly commissions

3. Total monthly pay package

4. Monthly sales

5. Total sales to date

Payroll as a percent of sales is also computed as is total salary plus commission for the period specified.

Program 9

Title: **Depreciation**

Author: P.C. Holman
University of Wisconsin
Stevens Point, WI

Memory Requirement: 16K
Statements: 462
Files: 5 ASCII Program

The program consists of five separate depreciation methods in five separate files:

1. Sum of digits

2. Straight line

3. Sum of digits, switch to straight line

4. Double declining balance

5. Double declining balance, switch to straight line

Each program calculates a depreciation table using that particular method. Each contains examples and is tutorial.

Program 10

Title: Machinery Cost Analysis
Author: Gene Laurel
      Ministry of Agriculture & Food
      Vineland Station,
      Ontario, CANADA
Memory Requirement: 16K
Statements: 227
Files: 1 ASCII Program

The program is based on straight-line depreciation with interest, insurance and housing calculated on one half of the new value. These determine fixed cost. Total cost is the sum of fixed cost and costs that vary each year, such as repairs, fuel and oil, and operators cost. The operating cost is total cost divided by hours of use per year. The User-Definable Keys are used to:

    input data

    calculate output

    display output

plot graph

User input includes:

    date (up to 15 characters)

    machine name (up to 40 characters)

    capital cost

    years of use

    resale value, % of capital cost

    interest rate, % per year

    annual use hours per year

    insurance + housing, % of capital cost per year

    repair costs, % of capital cost per 100 hours of use

    fuel and oil cost, $ per hour

    operator's wage, $ per hour

Program 11

Title: Capital Budget
Author: David Mills
      Tektronix, Inc.
      Beaverton, OR
Memory Requirement: 32K
Peripherals: Optional-4662 Plotter
Statements: 712
Files: 1 ASCII Program
      Requires dedicated tape

The program will build and maintain files of current capital budget projects. Up to 50 projects may be stored on one tape, with standard information as:

    Rank
    Project Description
    Budget (by quarter)
    Category
    Originator
    Actual cost
    Cumulative capital

Up to 30 sub-items may contribute to a project including:

    Item description
    Authorization number
    Cost
    Date
    Quarter

All information may be examined or altered to correct errors or changes in budget, etc.

Charts may be produced for one, or all projects, giving total project cost, cumulative cost, budget vs. actual expenditures, etc.

Cumulative and quarterly graphs of budget vs. actual cost for any project, or the total of all projects may be drawn.

Program 12

Title: **Gantt Chart**
Author: Connie Breithaupt
       Tektronix, Inc.
       Rockville, MD
Memory Requirement: 32K

Peripherals: Optional-4662 Plotter
Statements: 1617
Files: 4 ASCII Program
     3 Binary Data (Directory and
     Example)
     Requires pre-MARKed data files
     Requires dedicated tape

The program generates a chart and graph of activity versus time.

The following is input:

Project name—2 lines—15 characters each

Chart title—45 characters

Code—16 characters

Project Code—6 characters

Signatures—2 lines—30 characters each

Vertical row descriptions—single or double spaced—4 rows maximum

Horizontal row descriptions—single or double spaced—16 rows maximum

Weekly data for each row—28 weeks maximum—beginning with a Sunday

Charts are saved by name. The tape contains a directory of the charts by name.

Weekly data may be edited for each week or selected weeks.

Charts are generated for a 14-week period starting with a chosen beginning column date.

Three selected rows of data may be graphed on one chart. The first selected row will be graphed with a solid line, the second with a dotted line, and the third with a dashed line.
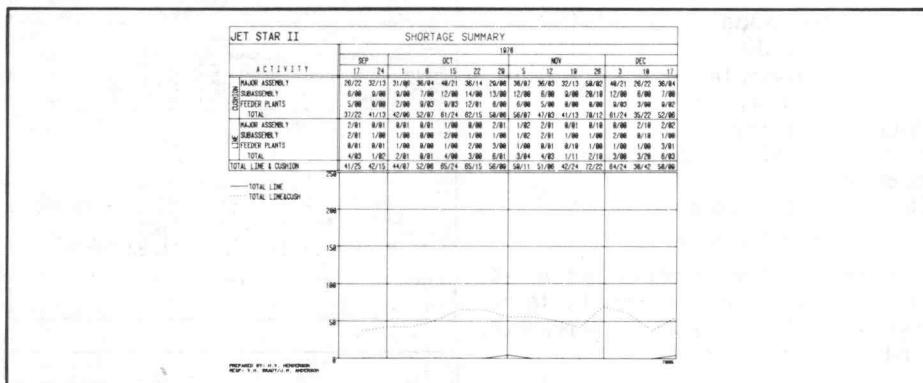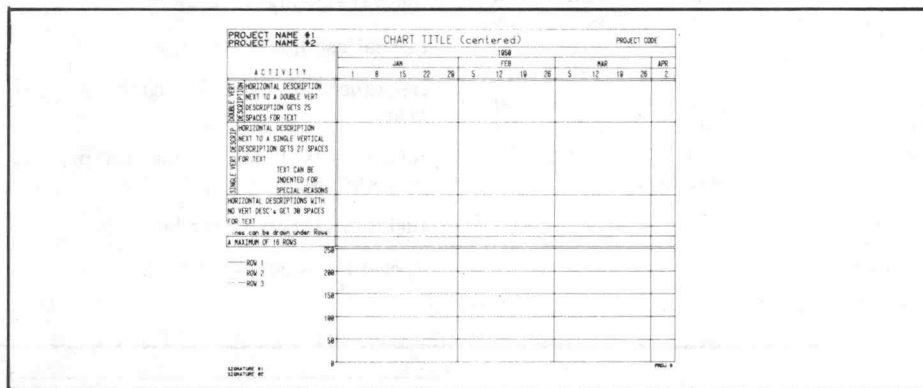
Program 13

Title: **Project-Schedule Chart**
Author: Polly Jennings
       Tektronix, Inc.
       Beaverton, OR
Memory Requirement: 32K
Peripherals: 4662 Plotter
Statements: 1265
Files: 10 ASCII Program
     Requires dedicated tape

The program creates a project-schedule chart for one year at a time for up to 66 individual activities per file. Up to 30 chart-data files can be stored on one tape cartridge. Chart data is created interactively by moving a dot on the 4050 screen to position the bars to where you want them in the time frame. Weeks and accounting periods are computed automatically from the starting data. An optional code is used to link groups of two or more (up to 20) dependent activities in a time-chain for coordinating their dates when one slips. A moving calendar is created by shifting the chart from 1 to 12 accounting periods using the edit functions. Edit functions include:

    switch or delete activities
    correct bar end or start dates
    re-write headers or text

Any of the following user-entries may be changed or corrected:

    5-letter file name
    Title (up to 30 characters)
    Periods starting accounting period
    Week starting number
    Name of activity (up to 24 characters)
    Group name or text inside the bar (up to 30 characters)

Old chart-data files may be accessed and edited or displayed on the screen at any time. They may then be plotted on the 4662 plotter in various colors, more activities added, corrected and saved to tape.

PROJECT AIDS D1
062-5986-01

Although the PROJECT AIDS disk seems to duplicate the PROJECT AIDS tape, three of the programs are slightly different. These three programs have been converted to operate with disk files: Business Simulation, MIPS and Gantt Chart.

Use all of the programs to do "what if modeling", maintain budgets, track costs, and schedule activities. The individual abstracts describe each program.

Two of the programs must be transferred from disk to their own dedicated disk. The documentation contains explicit instructions for accomplishing the transfers.

Title/
Previous Abstract #

Business Simulation
51/00-0718/0

Inventory/Production Modeling I
51/00-0501/0

4907 MIPS — A Management Information Processing System
51/07-0717/0

Time Lapse Analysis
51/00-0714/0

Project Hours Data Maintenance
51/00-0100/0

Engineering Expenses Data Maintenance
51/00-0101/0

Average Elasticity of Demand
51/00-0301/0

Sales Commission Projection
51/00-0801/0

Depreciation
51/00-0719/0

Machinery Cost Analysis
51/00-0720/0

Gantt Chart
51/07-0102/0

Capital Budget
51/00-0103/0

Project-Schedule Chart
51/00-0104/0

Program 1

Title: **Business Simulation**
Author: Gene Lynch
        Tektronix, Inc.
        Wilsonville, OR
Memory Requirement: 32K
Peripherals: Optional-4051R05 Binary
                  ROM Pack

Statements: 1096
Files: 5 Program

The program simulates a manufacturing firm. The effects of employee attrition, equipment failure, age of product, scheduling, finance, inventory, advertising, pricing, planned growth, research and development, inflation, overhead, hiring, firing, and training are included in the simulation.

The user has complete control of the operation of the company. The program supplies operational information and status reports from which the user must decide to: hire or fire people, increase or decrease advertising and R&D budgets, order parts and equipment, set production schedules and prices, and pay off outstanding notes.

Operation begins in March of manufacturing year 1 with no outstanding debts, $600,000 in liquid investments, 1 plant (20-machine capacity), 10 machines, 50 general employees, and 20 sales people. The current price for parts-per-unit is $100.

The program produces graphic reports as well as "consultants" reports.

The simulation of a business, division or process is a powerful tool for understanding its behavior and in determining appropriate actions.

Program 2

Title: **Inventory/Production Modeling I**

Author: Dennis R. Heckman

        Tektronix, Inc.

        Wilsonville, OR

Memory Requirement: 16K

Peripherals: Optional-4662 Plotter

                4641 Printer

Statements: 333

Files: 1 Program

This program is designed to naively represent a Manufacturing Operation producing one product. It demonstrates the advantage of run-time graphics in modeling. As inputs the program requires:

Ratios and Constants

An average production rate per worker
Total facility capacity
Desired backlog time
An average material waste ratio
An average lost order rate
Desired inventory risk factor

Initial Settings

Initial inventory
Initial order backlog
Initial production
Initial shipments

Order Entry

The number of iterations
The initial order level either
The growth rate or
The iteration number for a step change
The amount of the change

A series of equations are then used to model the various relationships while the order quantities are derived from a random number generator. The Work Force and Materials Inventory required for production at each iteration may be output.

You may change ratios, orders or settings by pressing the appropriate User-Definable Key.

Users may wish to make changes to the model/program for their own purposes. In the areas of material delays, variable reject rates for parts, work force turnover and learning curves for new hires, considerable improvements can be made.

Program 3

Title: **4907 MIPS — A Disk-Based Management Information Processing System**

Author: Jim Dillon

        Tektronix, Inc.

        Santa Clara, CA

Revised by: Leland Sheppard

            Sheppard Software Co.

            Sunnyvale, CA

Memory Requirement: 32K

Peripherals: 4907 File Manager

Statements: 1848

Files: 3 Program

4907 MIPS contains three programs. One converts old MIPS tape data files to disk data files. The other two maintain a data base from which they produce tabular and graphic comparison reports, one on a 12-period basis and one on a 13-period basis.

You may invoke 16 routines through a menu or through the User-Definable Keys:

    Add or change data in a file
    Generate a comparison tabulation and graph
    Generate a comparison tabulation
    Generate a comparison graph
    Produce multiple curve graph

    Produce ratio graph
    Produce percentage graph
    Invoke user-supplied graphing routine
    List file titles on disk
    List subfile titles in the current file
    List data in up to 7 subfiles
    Retrieve a data file from disk
    Save a data file to disk
    Copy the program
    Create a new data disk
    Invoke user-supplied utility routine

The 13-period data structure provides for 80 files with 14 "subfiles" in each and 13 entries in each subfile. The 12-period data structure provides for 1 to 300 files with 14 subfiles in each and 12 entries in each subfile.
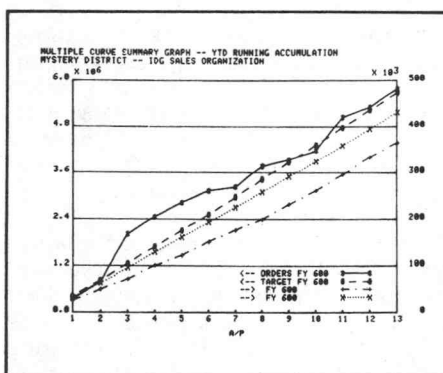
Tabular or graphic comparisons may be made of any two subfiles from one of the major files. In addition, multiple curve graphs may be obtained for up to five curves based on data from any subfiles chosen from any major files. When data is disparate, the program automatically generates different axis scales on each side of the graph.

Ratio or percentage graphs which use any subfile as the numerator and any subfile as the denominator are unique features of MIPS.

Newcomers to the 4050 System should be able to manipulate and graph data with ease. A sophisticated user will be able to modify and add code easily to perform special functions.

The program is general purpose and can be used on any type of data (dollars, man-years, percentages, expenses, orders and so on).

Program 4

Title: Time Lapse Analysis
Author: Wendell W. Berry
Memory Requirement: 16K-32K
Statements: 359
Files: 1 Program
       1 Data (Example)

This program provides a statistical analysis of elapsed time (in days) from one event to another in a particular process, such as invoice processing where specific calendar dates may be assigned to each event. The number of events and the number of samples are limited only by the amount of memory available.

You specify the number of comparisons and which events to compare, e.g., 3 comparisons which are events 1 and 2, events 3 and 5, and events 1 and 5. The program computes the absolute value of the difference in days between these events for all samples. These values are sorted; the frequency of identical elapsed times is the first tabular output. The number of different elapsed times are then computed along with the total usable samples, the mean, standard deviation, median, and mode of the elapsed times. These also are output in tabular form, and a bar graph produced showing the mean elapsed times for all comparisons.

You can gain access to any previously analyzed data for two further options. First, the dates on file for any or all events may be viewed and changes may be made. Secondly, detailed comparisons of two events, date by date, may be made. These options are useful in the explanation of specific data occurrences.

When entering data, you have the option of entering a "0" when a date is missing in the sample. This will be calculated as a "No match" during the comparison routines, and will not enter into the mean calculations, etc. Also included is the option of saving the information entered and computed by the program. This is done to allow later access to data, and is particularly useful in large data samples. The only limitation for data comparison is that the data must be complete. That is, the data must contain three sets of digits separated by a non-numerical character, following the format mo/day/year, where the year is presumed to be in this century and not requiring the entry of the preceding "19".

```
Review      ENTER EVENT NO 1, DATE NO 1   04/30/79
Typesetting ENTER EVENT NO 2, DATE NO 1   05/12/79
Layout      ENTER EVENT NO 3, DATE NO 1   05/21/79
Printing    ENTER EVENT NO 4, DATE NO 1   06/13/79
Mailing     ENTER EVENT NO 5, DATE NO 1   06/29/79
            ENTER EVENT NO 1, DATE NO 2   07/05/79
            ENTER EVENT NO 2, DATE NO 2   07/24/79
            ENTER EVENT NO 3, DATE NO 2   08/06/79
            ENTER EVENT NO 4, DATE NO 2   08/22/79
            ENTER EVENT NO 5, DATE NO 2   09/04/79
            ENTER EVENT NO 1, DATE NO 3   08/29/79
            ENTER EVENT NO 2, DATE NO 3   09/11/79
            ENTER EVENT NO 3, DATE NO 3   09/24/79
            ENTER EVENT NO 4, DATE NO 3   10/02/79
            ENTER EVENT NO 5, DATE NO 3   10/19/79
            ENTER EVENT NO 1, DATE NO 4   10/15/79
            ENTER EVENT NO 2, DATE NO 4   10/15/79
            ENTER EVENT NO 3, DATE NO 4   10/23/79
            ENTER EVENT NO 4, DATE NO 4   10/30/79
            ENTER EVENT NO 5, DATE NO 4   11/20/79
            ENTER EVENT NO 1, DATE NO 5   11/20/79
            ENTER EVENT NO 2, DATE NO 5   11/26/79
            ENTER EVENT NO 3, DATE NO 5   12/03/79
            ENTER EVENT NO 4, DATE NO 5   12/12/79
            ENTER EVENT NO 5, DATE NO 5   12/20/79
            ENTER EVENT NO 1, DATE NO 6   01/06/80
            ENTER EVENT NO 2, DATE NO 6   01/09/80
            ENTER EVENT NO 3, DATE NO 6   01/24/80
            ENTER EVENT NO 4, DATE NO 6   02/22/80
            ENTER EVENT NO 5, DATE NO 6   03/04/80
            ENTER EVENT NO 1, DATE NO 7   02/18/80
            ENTER EVENT NO 2, DATE NO 7   02/25/80
            ENTER EVENT NO 3, DATE NO 7   03/05/80
            ENTER EVENT NO 4, DATE NO 7   03/25/80
            ENTER EVENT NO 5, DATE NO 7   04/00/80
            ENTER EVENT NO 1, DATE NO 8   03/28/80
            ENTER EVENT NO 2, DATE NO 8   04/04/80
            ENTER EVENT NO 3, DATE NO 8   04/17/80
            ENTER EVENT NO 4, DATE NO 8   05/00/80
            ENTER EVENT NO 5, DATE NO 8   05/21/80
```

```
COMPARISON NO 1-ELAPSED TIME BETWEEN EVENT 1 AND 2
   ET  FREQ
    3    1
    6    1        Review
    7    2        Typesetting
   12    1
   13    1
   19    1
   20    1

COMPARISON NO 2-ELAPSED TIME BETWEEN EVENT 2 AND 3
   ET  FREQ
    7    1
    8    1        Typesetting
    9    2        Layout
   13    1
   15    3

COMPARISON NO 3-ELAPSED TIME BETWEEN EVENT 3 AND 4
   ET  FREQ
    7    1
    8    1
    9    1        Layout
   16    1        Printing
   20    1
   22    1
   23    1
   29    1

COMPARISON NO 4-ELAPSED TIME BETWEEN EVENT 4 AND 5
   ET  FREQ
    8    1
   11    1
   13    1
   14    1
   16    1
   17    1

COMPARISON NO 5-ELAPSED TIME BETWEEN EVENT 1 AND 5
   ET  FREQ
   30    1
   50    1
   51    1
   54    1
   56    1
   58    1
   60    1
   61    1
```

```
TOTAL SAMPLES      8.00

MEAN DELAY        16.75
STD DEVIATION      8.10
MEDIAN DELAY      16.00
MODE              NONE

COMPARISON NO 4-ELAPSED TIME BETWEEN EVENT 4 AND EVENT 5
DAYS OBSERVED      8.00
TOTAL SAMPLES      8.00

MEAN DELAY        14.00
STD DEVIATION      4.00
MEDIAN DELAY      13.00
MODE              NONE

COMPARISON NO 5-ELAPSED TIME BETWEEN EVENT 1 AND EVENT 5
DAYS OBSERVED      8.00
TOTAL SAMPLES      8.00

MEAN DELAY        52.50
STD DEVIATION      9.91
MEDIAN DELAY      54.00
MODE              NONE

COMPARISON NO 4-ELAPSED TIME BETWEEN EVENT 4 AND EVENT 5
DAYS OBSERVED      8.00
TOTAL SAMPLES      8.00

MEAN DELAY        14.00
STD DEVIATION      4.00
MEDIAN DELAY      13.00
MODE              NONE

COMPARISON NO 5-ELAPSED TIME BETWEEN EVENT 1 AND EVENT 5
DAYS OBSERVED      8.00
TOTAL SAMPLES      8.00

MEAN DELAY        52.50
STD DEVIATION      9.91
MEDIAN DELAY      54.00
MODE              NONE
```

Program 5

Title: Project Hours Data Maintenance
Author: Kathy Thurman
       Tektronix, Inc.
       Wilsonville, OR
Memory Requirement: 24K
Peripherals: Optional—4662 Plotter
Statements: 463

Files: 1 Program

This program allows the user to maintain data files containing period and total-to-date hours applied to a project for up to 24 periods. Data may be summarized by period and compared to available hours for the period. Both graphic and tabular output are available and graphic output may be either to the screen or to an X-Y plotter such as the 4662.
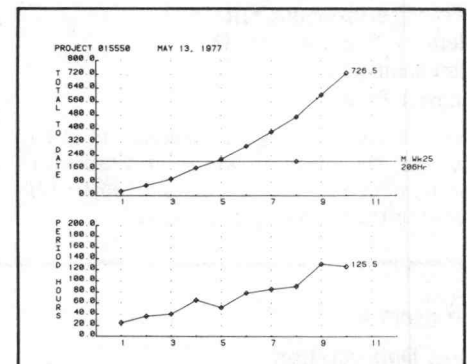
The program has seven functions driven by the User-Definable Keys:
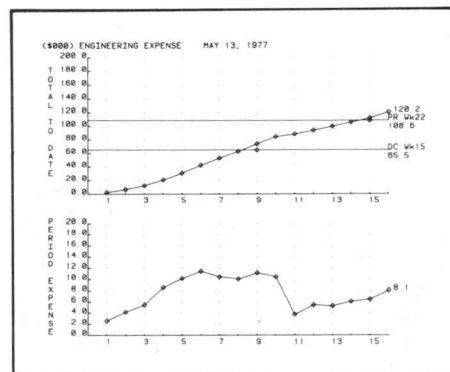
1. Enter data and print graph for one project

   Project Title, milestone data (if desired).

   The first time data is entered for a project the user has the option of entering data for prior periods or a beginning total-to-date. Each subsequent time data is entered for the project, the user has the option of modifying the milestone.

2. Change data: title, period hours, total-to-date hours

3. Graph stored data only

4. Summarize hours/period, compare to available hours

5. List of data file numbers and titles

6. Table of period, total-to-date hours

7. Store data on tape

Program 6

Title: **Engineering Expenses Data Maintenance**

Author: Kathy Thurman
Tektronix, Inc.
Wilsonville, OR

Memory Requirement: 16K

Peripherals: Optional-4662 Plotter

Statements: 421

Files: 1 Program

This program allows the user to maintain data files containing period and total-to-date engineering expense applied to a project for up to 50 periods. Both graphic and tabular output are available and graphic output may be either to the screen or to an X-Y plotter such as the 4662.

The program has seven functions driven by the User-Definable Keys:

1. Enter data and print graph for one project

   Project title, milestone data (if desired).

   The first time data is entered for a project the user has the option of entering data for prior periods or a beginning total-to-date. Each subsequent time data is entered for the project, the user has the option of modifying the milestone.

2. Change data: title, period data amounts, total-to-date data amounts

3. Graph stored data only

4. Graph any 12 periods

5. List of data file numbers and titles

6. Table of period, total-to-date values

7. Store data on tape

Program 7

Title: **Average Elasticity of Demand**

Author: Kathy Thurman
Tektronix, Inc.
Wilsonville, OR

Memory Requirement: 8K

Statements: 44

Files: 1 Program

This program will calculate average elasticity of demand within price intervals. Maximum revenue occurs at the elasticity index of 1.

The user is asked to input:

1. The number of unit prices to be considered.

2. The prices to be considered and the quantity demanded at each price.

Prices need to be entered in ascending or descending order as the program calculates average elasticity within price intervals. The price interval with an elasticity index nearest to 1 can be broken down into smaller price intervals and the program run again. This may be repeated to determine the exact price that would yield maximum revenue.

The output is in the form of a table showing the quantity demanded and elasticity index for each price interval.

Program 8

Title: **Sales Commission Projection**

Author: Kathy Thurman
Tektronix, Inc.
Wilsonville, OR

Memory Requirement: 8K

Statements: 52

Files: 1 Program

In response to values for variables input by the user, this program will print a table for the number of months specified (up to 12) showing the following projections:

1. Monthly base salary

2. Monthly commissions

3. Total monthly pay package

4. Monthly sales

5. Total sales to date

Payroll as a percent of sales is also computed as is total salary plus commission for the period specified.

Program 9

Title: **Depreciation**

Author: P.C. Holman
University of Wisconsin
Stevens Point, WI

Memory Requirement: 16K

Statements: 459

Files: 5 Program

The program consists of five separate depreciation methods in five separate files:

1. Sum of digits

2. Straight line

3. Sum of digits, switch to straight line

4. Double declining balance

5. Double declining balance, switch to straight line

Each program calculates a depreciation table using that particular method. Each contains examples and is tutorial.

Program 10

Title: **Machinery Cost Analysis**
Author: Gene Laurel
Ministry of Agriculture & Food
Vineland Station,
Ontario, CANADA
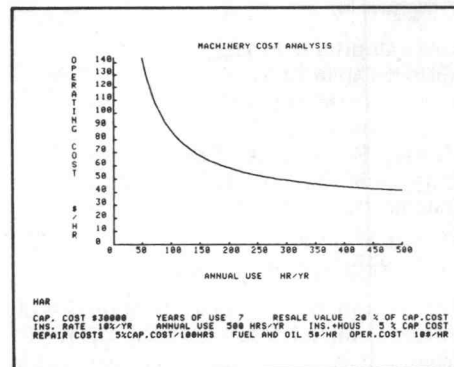Memory Requirement: 16K
Statements: 224
Files: 1 Program

The program is based on straight-line depreciation with interest, insurance and housing calculated on one half of the new value. These determine fixed cost. Total cost is the sum of fixed cost and costs that vary each year, such as repairs, fuel and oil, and operators cost. The operating cost is total cost divided by hours of use per year. The User-Definable Keys are used to:

  input data

  calculate output

  display output

  plot graph

User input includes:

  date (up to 15 characters)

  machine name (up to 40 characters)

  capital cost

  years of use

  resale value, % of capital cost

  interest rate, % per year

  annual use hours per year

  insurance + housing, % of capital cost per year

  repair costs, % of capital cost per 100 hours of use

  fuel and oil cost, $ per hour

  operator's wage, $ per hour

Program 11

Title: **Gantt Chart**
Author: Connie Breithaupt
Tektronix, Inc.
Rockville, MD
Memory Requirement: 32K

Peripherals: Optional-4662 Plotter
Statements: 1625
Files: 5 Program
10 Data (example)

The program generates a chart and graph of activity versus time.

The following is input:

Project name—2 lines—15 characters each

Chart title—45 characters

Code—16 characters

Project Code—6 characters

Signatures—2 lines—30 characters each

Vertical row descriptions—single or double spaced—4 rows maximum

Horizontal row descriptions—single or double spaced—16 rows maximum

Weekly data for each row—28 weeks maximum—beginning with a Sunday

Charts are saved by name. File 5 of the tape version contains a directory of the charts by name.

Weekly data may be edited for each week or selected weeks.

Charts are generated for a 14-week period starting with a chosen beginning column date.

Three selected rows of data may be graphed on one chart. The first selected row will be graphed with a solid line, the second with a dotted line, and the third with a dashed line.
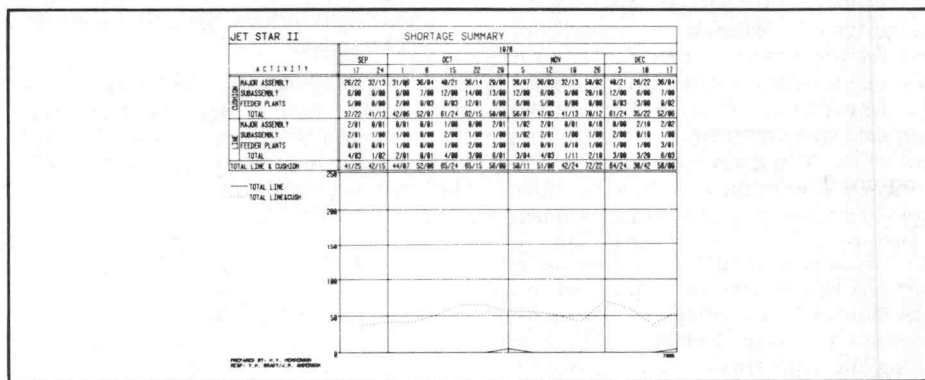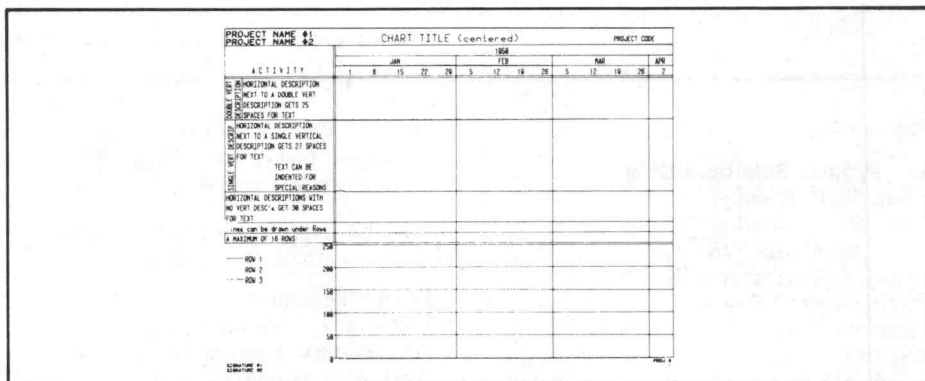
Program 12

Title: **Capital Budget**
Author: David Mills
        Tektronix, Inc.
        Beaverton, OR
Memory Requirement: 32K
Peripherals: Optional-4662 Plotter
Statements: 712
Files: 1 Program
        Requires dedicated tape

The program will build and maintain files of current capital budget projects. Up to 50 projects may be stored on one tape, with standard information as:

    Rank
    Project Description
    Budget (by quarter)
    Category
    Originator
    Actual cost
    Cumulative capital
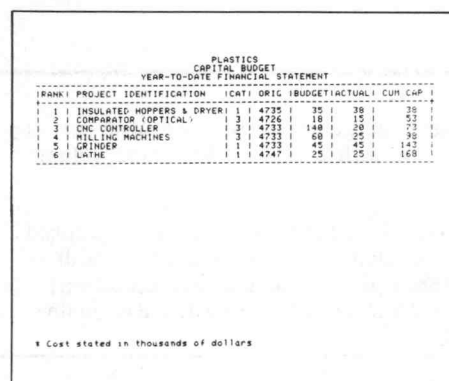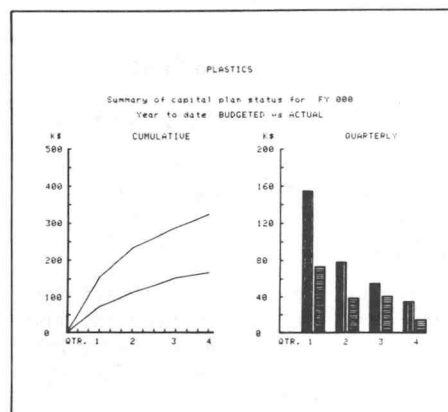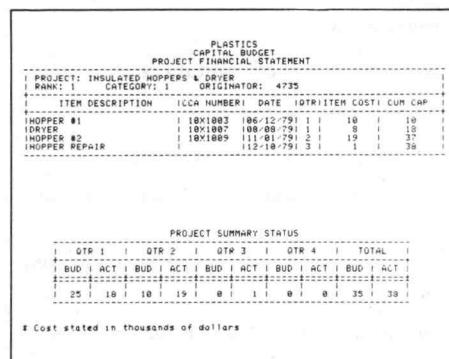
Up to 30 sub-items may contribute to a project including:

    Item description
    Authorization number
    Cost
    Date
    Quarter

All information may be examined or altered to correct errors or changes in budget, etc.

Charts may be produced for one, or all projects, giving total project cost, cumulative cost, budget vs. actual expenditures, etc.

Cumulative and quarterly graphs of budget vs. actual cost for any project, or the total of all projects may be drawn.

Program 13

Title: **Project-Schedule Chart**
Author: Polly Jennings
        Tektronix, Inc.
        Beaverton, OR
Memory Requirement: 32K
Peripherals: 4662 Plotter
Statements: 1265
Files: 10 Program
        First 10 on tape or recode statements
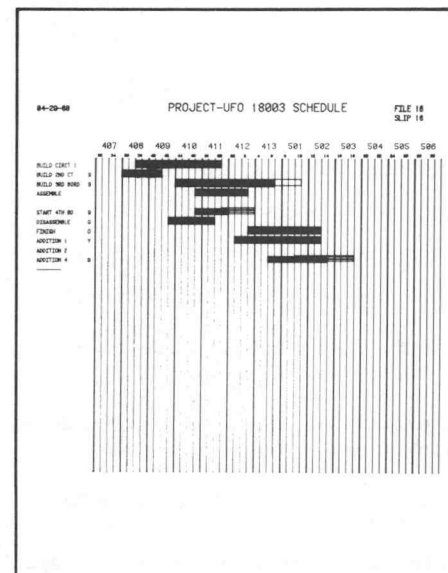   Requires pre-marked data files

The program creates a project-schedule chart for one year at a time for up to 66 individual activities per file. Up to 30 chart-data files can be stored on one tape cartridge. Chart data is created interactively by moving a dot on the 4050 screen to position the bars to where you want them in the time frame. Weeks and accounting periods are computed automatically from the starting data. An optional code is used to link groups of two or more (up to 20) dependent activities in a time-chain for coordinating their dates when one slips. A moving calendar is created by shifting the chart from 1 to 12 accounting periods using the edit functions. Edit functions include:

switch or delete activities
correct bar end or start dates
re-write headers or text

Any of the following user-entries may be changed or corrected:

5-letter file name
Title (up to 30 characters)
Periods starting accounting period
Week starting number
Name of activity (up to 24 characters)
Group name or text inside the bar (up to 30 characters)

Old chart-data files may be accessed and edited or displayed on the screen at any time. They may then be plotted on the 4662 plotter in various colors, more activities added, corrected and saved to tape.

RECREATION PLOTS T1
062-5989-01

From military maneuvers to greeting cards, this package has a miscellany of novel programs. Take a look at the individual abstracts for a description of 34 routines included on this tape.

One of the programs must be transferred to its own tape. The documentation includes instructions for accomplishing the transfer.

Title/
Previous Abstract #

Recreation Plots #1
51/00-6501/0
Hand Calculator
51/00-6001/0
Transposition-Music
51/00-6105/0
Baby Announcement Card
51/00-6006/0
Greeting Cards & Party Invitation
51/00-6004/0
War-At-Sea
51/00-9525/0

Program 1

Title: **Recreational Plots #1**
Memory Requirement: 8K—24K
Statements: 5991
Files: 24 ASCII Program
      1 Binary Data

Twenty-three 4050 Series Graphic plots help the newcomer to computers interact with the friendly 4050 Series Systems. But the diversions are geared for the most experienced computer operator as well. Some of the programs test your logic or math skills, others your dexterity on the User-Definable Keys; some simply display the fine resolution of your graphic screen.

Included
are:

Shoot	Computer Tic Tac Toe
Lunar Lander	I.Q.
Qubic	Pinball
Weather War	Mugwump
Othello	Blackjack
Golf Game #1	Hamurabi
Golf Game #2	Biorhythm
Wumpus	Land Mines
Hangman	Computer Art
Acey Ducey	Polygons
Ping Pong	Mastermind
Tic Tac Toe for 2	

Program 2

Title: **Hand Calculator**
Author: Brian Diehm
        Tektronix, Inc.
        Wilsonville, OR
Memory Requirement: 16K
Statements: 359
Files: 1 ASCII Program

This program allows the 4050 to be used in a manner similar to several hand-held calculators currently on the market, specifically those operating in reverse "Polish" notation with a 4-place operational stack.

Complete explanation of the operational stack allows the user to perform serial, chained, mixed chain calculations; monadic, trigonometric and dyadic functions; percentage problems; register storage and arithmetic and many other operations.

The input to the program is accomplished by use of the User-Definable Keys or the keyboard. Input is interactive with the user; just like a hand-held calculator.

Output is placed on the screen. As each new display is presented, it is written on the screen below the previous one. Also, a record of the input keys is provided on the screen.

Complete explanation of the operational stack allows the user to perform the following calculations:

serial calculation
chained calculation
mixed chained calculation
monadic, trigonometric and dyadic functions
percentage problem calculations
register storage and arithmetic

KEY	LABEL	TAPE FILE	FUNCTION
1	1(Y^X)		The digit 1 and the function Y^X.
2	2(√)		The digit 2 and the function √.
3	3(10^X)		The digit 3 and the base 10 antilog function.
4	4(LX)		The digit 4 and the function "change in percent".
5	5(%)		The digit 5 and the percent function.
6	6(1/x)		The digit 6 and the reciprocal function.
7	7(ARC)		The digit 7 and the ARC trig function shift.
8	8(SIN)		The digit 8 and the SIN function.
9	9(COS)		The digit 9 and the COS function.
10	0(TAN)		The digit 0 and the TAN function.
11	.(LOG)		The decimal point and the Base 10 Logarithm function.
12	CHS(LN)		The "change sign" directive and the natural logarithm function.
13	EEX(e^X)		The "enter exponent" directive and the natural antilog function.
14	CLX(CLEAR)		The clear x function and the clear calculator directive.
15	( )		The color shift (alternate function) key.
16	+(X↕Y)		The Add function and the X-Y swap directive.
17	-(R↓)		The Subtract function and the roll stack directive.
18	×(STO)		The Multiply function and the store register shift key.
19	÷(RCL)		The Divide function and the recall register shift key.
20	ENTER↑(π)		The Enter directive and the π constant.

Program 3

Title: **Transposition-Music**
Authors: Dr. P.C. Holman
         Mrs. Janet Bruegl
         Michael Voica
         James Wood
         University of Wisconsin
         Stevens Point, WI
Memory Requirement: 32K
Statements: 416
Files: 1 ASCII Program

With this program a piece of music written in the key of 'C' may be transposed into four voices (soprano, alto, tenor and bass) and into the chord at the same time. The invention of a universal keyboard numbering system makes it possible to communicate music to the computer. This technique is non-language dependent meaning that non-English speaking persons are able to transpose music with this program with a minimum of problems.

Begin with the first note of the melody and enter each note using the universal keyboard numbering system. A "clinker" preventer is built in. If a user enters an out-of-range or illogical note, the computer adjusts the note. Alternative possibilities for a note are printed on the screen with the best choice at the end.

Function keys include:

Call Menu
Run Program
Change Data
List Data
Append Data
Insert Data
Printout

The program is tutorial.

Program 4

Title: **Baby Announcement Card**
Author: Allen G. Hahn
        Hesston Corporation
        Hesston, KS
Memory Requirement: 24K
Statements: 371
Files: 1 ASCII Program

The program draws a Baby Announcement Card on the 4050 Series Graphic System screen. The program is self-contained and produces a card, when folded, that is 3 1/8" X 4 1/4", by folding the paper into fourths. Required input is the baby's name and birth statistics (up to 8 lines).

Program 5

Title: **Greeting Cards & Party Invitations**
Author: Erwin Vogel
Fairchild Space & Electronics Co.
Germantown, MD
Memory Requirement: 32K
Statements: 933
Files: 8 ASCII Program

The program has seven separate programs to print text in fancy patterns.

Program 1: Prints 16 lines of text in the form of 4 flowers.

Program 2: Prints text in the form of a heart. The hearts are repeated—scaling text and pattern—4, 5, or 6 times.

Program 3: Prints text in the form of a knot pattern.

Program 4: Distorted lettering—printing radially outward from a circle.

Program 5: Distorted lettering—printing to fit inside a heart.

Program 6: Prints a party invitation, lettering (message) in the form of a house.

Program 7: Calculates when a special birthday occurs. Such as a billion seconds old, or 10,000 days. Input is the day and time of birth; desired anniversary. Output is the date of the event.

The first five programs use as a subroutine an alphabet generated by the author. The alphabet contains only capital letters. The subroutine specifications (input) are:

A = letter width
B = letter height
S = slant
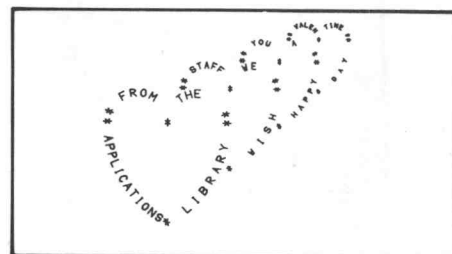
Program 6

Title: **A One-on-One Interactive War-at-Sea Model**
Authors: Jack Nance
Jean Cishek
Center for Naval Analyses
Arlington, VA
Memory Requirement: 32K
Peripherals: 4051R05 Binary ROM
Statements: 1880
Files: 17 Binary Program
Requires dedicated tape

Two people play against each other; one controls the aircraft the other the ship. The aircraft's mission is to locate and attack the ship; the ship's mission is to survive the attack and destroy the aircraft if possible.

The screen is divided in half; the aircraft message board and display on the left, the ship's on the right. Each player is prompted for the initial conditions:

AIRCRAFT	SHIP
type	type
heading	heading
speed	speed
altitude	
type of weapons and load	
aiming and ballistic mil errors	
spacing between bombs	

then

The User-Definable Keys are used to control the following operations:

turn the aircraft
change aircraft speed
enlarge aircraft's picture
change aircraft altitude (ft/min)
release aircraft ordnance load on target
change scale on the aircraft's picture
change basic time step increment
turn ship
change ship speed
launch surface-to-air missiles at aircraft
change scale on ship's picture
change basic time step increment
end exercise and obtain engagement summary

FIGURE 8: ROCKEYE BOMBING RESULTS
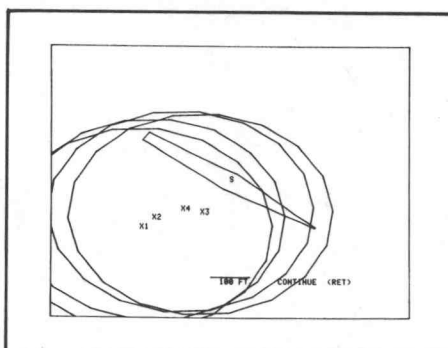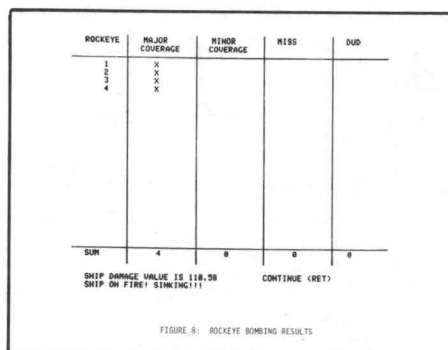
SLIDEMAKER T1
062-5962-01

SLIDEMAKER T1 is a tape collection of slidemaker programs. A variety of lettering styles, object and borders is represented in this collection as well as various degrees of interactivity. The individual abstracts describe each program.

Use these programs to generate overhead slides, signs and other visual aids.

Title/
Previous Abstract #

Sign Maker III
51/07-9545/0

Sign Maker IV
52/07-9546/0

Slidemaker I
51/00-9513/0

Slidemaker II
51/07-9531/1

Advanced Media Graphics
51/00-9516/0

Frames
51/00-9548/0

Program 1

Title: **Sign Maker III**

Author: Mallory M. Green
        Dept. of HUD
        Washington, D.C.

Memory Requirement: 32K

Peripherals: 4662/4663 Plotter
             Optional-4907 File Manager

Statements: 995

Files: 1 ASCII Program

Sign Maker III is an interactive easy-to-use sign making program. The user may create, modify, plot, display, or save and recall signs from tape or disk.

Through the User-Definable Keys the user can add, delete, or modify individual text lines. Text may be centered, positioned, scaled and rotated. It may be made bold through multiple strokes.

The signs can include boxes, circles, lines, and page boundaries.

The signs may be plotted in one or multiple colors.

Program limits:

72 characters per text line
20 text lines and/or shapes per sign with 32K system
200 text lines and/or shapes per sign with 64K system

SIGN MAKER III   EXAMPLE 1

BOX GIVEN CORNERS   CIRCLES   MESH OF LINES

FEATURES OF SIGN MAKER III

TUTORIAL   STROKES   1 2 3 4 5   SAVES CHART TO TAPE OR DISK   LINE
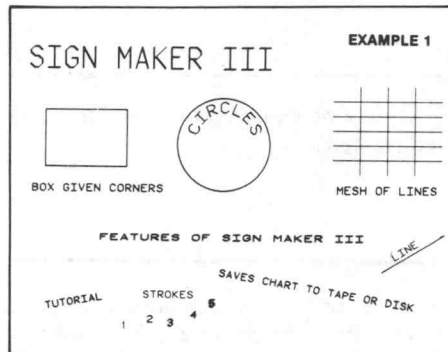
EXAMPLE 2

EXPENDITURES BY YEAR

DEPT	74	75	76	77	78	79	80
HUD							
HEW							
DOT							
NASA							
GSA							

Program 2

Title: **Sign Maker IV**

Author: Mallory M. Green
       Dept. of HUD
       Washington, D.C.
Memory Requirement: 64K
Peripherals: 4662/4663 Plotter
       Optional-4907 File Manager

Statements: 1168
Files: 2 ASCII Program
     8 Binary Data

Sign Maker IV is the Sign Maker III program with the following four fonts added:

    Roman
    Roman Italic
    Gothic
    Script

Like Sign Maker III, it's interactive and easy to use. The user may create, modify, plot, display, save and recall signs. Individual text lines may be added, deleted or modified through the User-Definable Keys.

Signs can be drawn in one or multiple colors and can include shapes such as boxes, circle and lines.

Text may be centered or position, scaled and rotated.

Program 3

Title: **Slidemaker I**

Author: Will Gallant
      Tektronix, Inc.
      Wilsonville, OR
Memory Requirement: 8K
Peripherals: 4662 Plotter
Statements: 283
Files: 1 ASCII Program

This program aids in making overhead transparencies.

Text may be input to the 4050 and drawn on the 4662 Interactive Digital Plotter with full control over position and letter size. The operator may manually position the text using the plotter's joystick or specify a Y position and allow the program to automatically center the text on the page. An option is available to generate centered text in bold letters for contrast or emphasis. Special functions such as left and right justification, lines, boxes, and diamonds are also available.

A pie chart routine is included in this program. Any number of segments may be assigned text and a value. The annotation is printed radially on the center line of its respective sector of the pie. The program will compute and annotate each segment in percentage form if desired. Any one segment

of the chart can be exploded a specified distance from the pie for graphic emphasis.

Changes may be made and pie chart redrawn.

Program 4

Title: **Slidemaker II**
Author: John R. Carter
        Tektronix, Inc.
        Santa Clara, CA
Memory Requirement: 32K
Peripherals: 4662 Plotter
        Optional-4907 File Manager
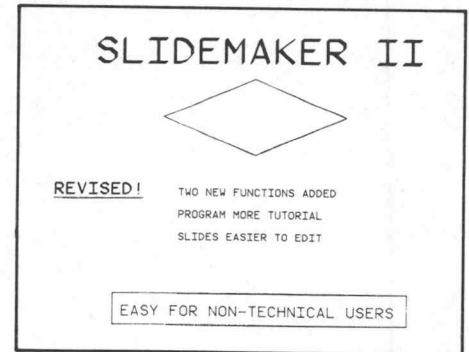Statements: 918
Files: 2 ASCII Program
     1 ASCII Text

Slidemaker II offers a highly versatile tool for creating professional and sophisticated presentation aids.

The main features are:

1. Standard type sizes selected with a single variable (A—W).

2. Tab selections that operate like a typewriter.

3. Variable type sizes and color changes possible on the same line of type, including choice of bold or normal type on the same line.

4. Fast line centering.

5. Input a full page of text in one operation with only one pen setting at the beginning. Text may be centered, left or right justified.

6. Save and retrieve plots on either cartridge tape or disk. Tape files must be pre-MARked.

7. Edit text at any time.

8. Alter retrieved plot and save new plot in same or separate file.

9. Graphics symbols available: Line, Box, or Diamond. Draw anywhere on plotter surface.


```
SLIDEMAKER II

          <>

REVISED!   TWO NEW FUNCTIONS ADDED
           PROGRAM MORE TUTORIAL
           SLIDES EASIER TO EDIT

       EASY FOR NON-TECHNICAL USERS
```

Program 5

Title: **Advanced Media Graphics**
Authors: Patrick Rafferty
        Lyle Wallis
        University of Missouri
        Columbia, MO
Memory Requirement: 24K
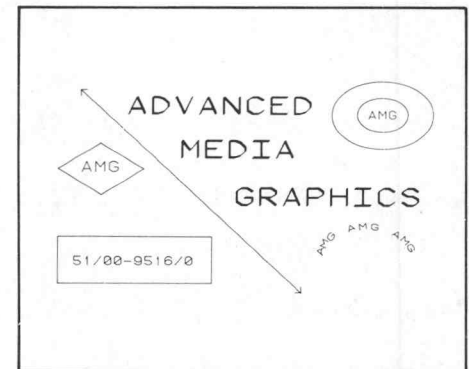Peripherals: 4662 Plotter
        4952 Joystick
Statements: 795
Files: 1 ASCII Program

Advanced Media Graphics (AMG) speeds preparation of visual aids and program documentation. AMG draws diamonds, boxes, lines and circles; rotates text, draws titles, simplifies outlining, rotates arrow heads, and flowcharts with complete preview and delete capabilities. The 4952 Joystick is required for the flowchart section only.

AMG functions are:

1. Title and Text section.
2. Arc-Character section.
3. Box.
4. Circle.
5. Diamond.
6. Line.
7. Outline section allowing user to set tab and character scale variables to speed outlines; includes text input.
8. Flowchart—an independent code section that uses the command processor concept and the pointer command to allow the user to choose both the position and the type of figure with only one keystroke.
9. Arrowhead section.

AMG enables the user to create high quality graphics on paper, overhead projector transparencies and slides. An interactive approach has been taken to make it as easy as possible to use the full capabilities.


```
                    ADVANCED
         <AMG>
     <>              MEDIA
    AMG
                    GRAPHICS
  51/00-9516/0        AMG AMG AMG
```

Program 6

Title: **Frames**
Author: Mike Tharpe
        Honewell, Inc.
        Minneapolis, MN
Memory Requirement: 16K
Peripherals: Optional-4662 Plotter
Statements: 540
Files: 1 ASCII Program

For the final touch, frame your slides

"Frames" consists of 12 different designs which may be drawn around your slide on the screen or 4662 Plotter.

    Spokes
    Circles
    Spokes and Circles

Straight-Edged
Straight-Edged
with Perspective Slants
Six Pointed Stars
Maze
Boxes within Boxes
French Provincial
Cross-Hatched
Sunburst
Corners Only

Instructions for changing the size of your border are included.

SLIDEMAKER D1
062-5963-01

SLIDEMAKER D1 is a disk collection of slidemaker programs. A variety of lettering styles, object and borders is represented in this collection as well as various degrees of interactivity. The individual abstracts describe each program.

Use these programs to generate overhead slides, signs and other visual aids.

Title/
Previous Abstract #

Sign Maker III
51/07-9545/0

Sign Maker IV
52/07-9546/0

Slidemaker I
51/00-9513/0

Slidemaker II
51/07-9531/1

Advanced Media Graphics
51/00-9516/0

Frames
51/00-9548/0

Program 1

Title: **Sign Maker III**
Author: Mallory M. Green
    Dept. of HUD
    Washington, D.C.
Memory Requirement: 32K
Peripherals: 4662/4663 Plotter
    Optional-4907 File Manager

Statements: 995
Files 1 Program

Sign Maker III is an interactive easy-to-use sign making program. The user may create, modify, plot, display, or save and recall signs from tape or disk.

Through the User-Definable Keys the user can add, delete, or modify individual text lines. Text may be centered, positioned, scaled and rotated. It may be made bold through multiple strokes.

The signs can include boxes, circles, lines, and page boundaries.

The signs may be plotted in one or multiple colors.

Program limits:

72 characters per text line
20 text lines and/or shapes per sign with 32K system
200 text lines and/or shapes per sign with 64K system

Program 2

Title: **Sign Maker IV**

Author: Mallory M. Green
        Dept. of HUD
        Washington, D.C.
Memory Requirement: 64K
Peripherals: 4662/4663 Plotter
           Optional-4907 File Manager

Statements: 1168
Files: 2 Program
      8 Data

Sign Maker IV is the Sign Maker III program with the following four fonts added:

     Roman
     Roman Italic
     Gothic
     Script

Like Sign Maker III, it's interactive and easy to use. The user may create, modify, plot, display, save and recall signs. Individual text lines may be added, deleted or modified through the User-Definable Keys.

Signs can be drawn in one or multiple colors and can include shapes such as boxes, circle and lines.

Text may be centered or position, scaled and rotated.

Program 3

Title: **Slidemaker I**

Author: Will Gallant
        Tektronix, Inc.
        Wilsonville, OR
Memory Requirement: 8K
Peripherals: 4662 Plotter
Statements: 282
Files: 1 Program

This program aids in making overhead transparencies.

Text may be input to the 4050 and drawn on the 4662 Interactive Digital Plotter with full control over position and letter size. The operator may manually position the text using the plotter's joystick or specify a Y position and allow the program to automatically center the text on the page. An option is available to generate centered text in bold letters for contrast or emphasis. Special functions such as left and right justification, lines, boxes, and diamonds are also available.

A pie chart routine is included in this program. Any number of segments may be assigned text and a value. The annotation is printed radially on the center line of its respective sector of the pie. The program will compute and annotate each segment in percentage form if desired. Any one segment of the chart can be exploded a specified distance from the pie for graphic emphasis.

Changes may be made and pie chart redrawn.

Program 4

Title: **Slidemaker II**
Author: John R. Carter
       Tektronix, Inc.
       Santa Clara, CA
Memory Requirement: 32K
Peripherals: 4662 Plotter
       Optional-4907 File Manager
Statements: 918

Files: 2 Program
     1 Text

Slidemaker II offers a highly versatile tool for creating professional and sophisticated presentation aids.

The main features are:

1. Standard type sizes selected with a single variable (A—W).

2. Tab selections that operate like a typewriter.

3. Variable type sizes and color changes possible on the same line of type, including choice of bold or normal type on the same line.

4. Fast line centering.

5. Input a full page of text in one operation with only one pen setting at the beginning. Text may be centered, left or right justified.

6. Save and retrieve plots on either cartridge tape or disk. Tape files must be pre-MARked.

7. Edit text at any time.

8. Alter retrieved plot and save new plot in same or separate file.

9. Graphics symbols available: Line, Box, or Diamond. Draw anywhere on plotter surface.

Program 5

Title: **Advanced Media Graphics**
Authors: Patrick Rafferty
       Lyle Wallis
       University of Missouri
       Columbia, MO
Memory Requirement: 24K
Peripherals: 4662 Plotter
       4952 Joystick
Statements: 795

Files: 1 Program

Advanced Media Graphics (AMG) speeds preparation of visual aids and program documentation. AMG draws diamonds, boxes, lines and circles; rotates text, draws titles, simplifies outlining, rotates arrow heads, and flowcharts with complete preview and delete capabilities. The 4952 Joystick is required for the flowchart section only.

AMG functions are:

1. Title and Text section.
2. Arc-Character section.
3. Box.
4. Circle.
5. Diamond.
6. Line.
7. Outline section allowing user to set tab and character scale variables to speed outlines; includes text input.
8. Flowchart—an independent code section that uses the command processor concept and the pointer command to allow the user to choose both the position and the type of figure with only one keystroke.
9. Arrowhead section.

AMG enables the user to create high quality graphics on paper, overhead projector transparencies and slides. An interactive approach has been taken to make it as easy as possible to use the full capabilities.

Program 6

Title: **Frames**
Author: Mike Tharpe
       Honewell, Inc.
       Minneapolis, MN
Memory Requirement: 16K
Peripherals: Optional-4662 Plotter
Statements: 540

Files: 1 Program

For the final touch, frame your slides

''Frames'' consists of 12 different designs which may be drawn around your slide on the screen or 4662 Plotter.

    Spokes
    Circles
    Spokes and Circles
    Straight-Edged
    Straight-Edged with Perspective
    Slants

    Six Pointed Stars
    Maze
    Boxes within Boxes
    French Provincial
    Cross-Hatched
    Sunburst
    Corners Only

Instructions for changing the size of your border are included.
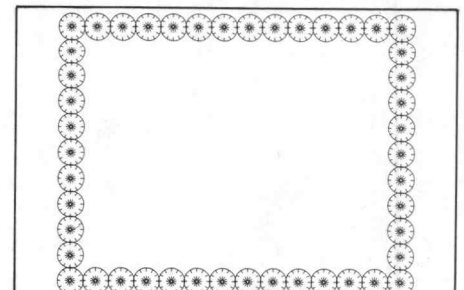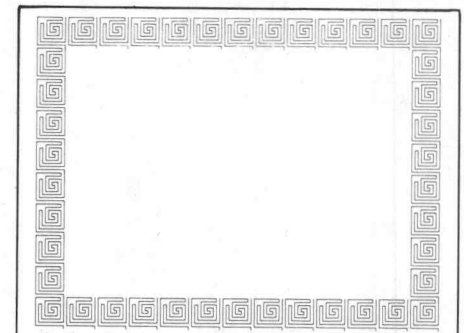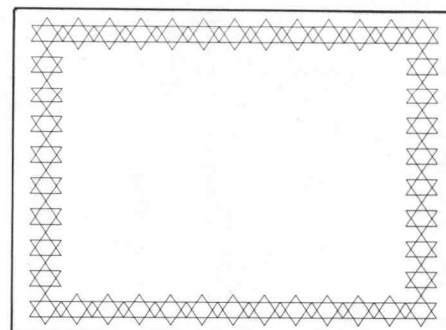
TEXT PROCESSING T1
062-5969-01

TEXT PROCESSING T1 is a tape collection of programs to help you with various clericl tasks such as:

- Text Entry/Editing/Formatting/ Storage/Printing
- Mailing Label Data Base Maintenance/Printing
- Recording/Cataloging/Inventory

The individual abstracts describe each program.

Eight of the programs maintain their own storage files; consequently, each of these programs must be transferred to its own tape. The documentation for each details the steps to accomplish the transfers.

Title/
Previous Abstract #

Line Editor
51/00-8007/0
Text Editor
51/00-8038/0
2-D String Arrays and Sorting of String Matrices
51/00-8008/0
Library Catalog
51/00-6107/0
Publication Distribution
51/00-6103/0
Inventory File System
51/00-6109/0
Grade Recorder
51/00-6104/0

Print Mail Addresses and Form Letters
51/00-6002/0
$EDIT.DOS
52/07-8047/0
$FORMAT
51/07-8018/1
Bibliography Management & Search
51/00-8045/0
Micro-Grasp
51/00-8043/0

Program 1

Title: **Line Editor**
Author: Dee Davis
　　　　Tektronix, Inc.
　　　　Wilsonville, OR
Memory Requirement: 7K plus space
　　　　　　　　　　　　for text
Statements: 228
Files: 1 ASCII Program
　　　　Requires pre-marked data file

The editor accepts free form text from keyboard or ASCII magnetic tape files, allows alterations, and saves the altered file on tape again — can accept 308 lines.

The editor consists of subroutines controlled by the User-Definable Keys. They can:

Open file and form string array
List lines
Delete lines
Insert lines
Swap lines
Insert characters at specified position
Delete characters at specified position
Character search: list lines and number of occurrences
Renumber in basic
Clean file
Save file

Program 2

Title: **Text Editor**
Author: Dennis Ward
　　　　Tektronix, Inc.
　　　　Beaverton, OR
Memory Requirement: 32K
Statements: 262
Files: 1 ASCII Program
　　　　Requires pre-marked file

The program edits text or program files without using syntax-dependent, complicated command forms. The commands are entered by number:

1 - Enter text from keyboard or get from tape file
2 - List lines of text (all or part)
3 - Delete lines of text (line #'s)
4 - Insert lines (insert before line #)
5 - Swap lines (input 2 line numbers)
6 - Search and replace characters (start at beginning of line #)
7 - Renumber lines (start at line # and increment)
8 - Save on tape (pre-marked file #)
9 - Quit

```
1 = MAKE TEXT FROM KEYBOARD OR GET TEXT FROM FILE
2 = LIST LINES OF TEXT
3 = DELETE LINES OF TEXT
4 = INSERT LINES
5 = SWAP LINES
6 = SEARCH AND REPLACE CHARACTERS
7 = RENUMBER LINES
8 = SAVE ON TAPE
9 = LIST TEXT TO PRINTER
10= QUIT


WHICH ACTION?
```

```
ENTER TEXT FROM KEYBOARD, WHEN FINISHED ENTER '$'
  1 THIS IS A TEXT FILE
  2 THE NUMBER AT THE BEGINNING IS ONLY A REFERENCE,
  3   IT IS NOT PART OF THE TEXT.
  4 With a regular text file like this one, do not use
  5   'RENUMBER' (Option #7).
  6 Option #7 takes the first group of charaters in each
  Option #7 takes the first group of characters in each line,
  7   and replaces it with a number.
  8 In line 6, you can see how the EXPAND, COMPRESS looks.
  9 In this line you can see the ███ RUBOUTS.
 10 THAT'S ENOUGH FOR NOW. 1"#$%&'()#=:<[>]~!?/>(,@'\\|
 11 $
THE FILE IS 10 LINES LONG.
PRESS RETURN TO GO ON.
```

Program 3

Title: **2-D String Arrays and Sorting of String Matrices**
Author: Nick Fkiaras
　　　　Tektronix, Inc.
　　　　Wilsonville, OR
Memory Requirement: 8K
Peripherals: Optional-4641 Printer
Statements: 151
Files: 1 ASCII Program
　　　　Requires pre-marked data file

The program allows the user to define an N x M matrix whose elements are alphanumeric strings. Data is entered either from the keyboard or from tape. Any number of columns and/or rows can be listed. The data can be sorted according to any column. Individual elements can be changed and the new matrix can be saved on tape again. Listing can be done on the 4050 display or 4641 printer.

```
**DATA**

JOHNSON, GEORGE   8521        90        A
NICOLSON, JAMES   4563        80        B
SMITH, PATRIC     9632        60        C-
TAYLOR, JOHN      1234        70        C-
YANBLOWSKI, DIC   8745        50        D
```

```
MATRIX DIMENSIONS,LENGTH OF LARGEST ITEM
5,4,15

ENTER DATA
ELEMENT:   1   1   TAYLOR, JOHN
ELEMENT:   1   2   1234
ELEMENT:   1   3   70
ELEMENT:   1   4   C

ELEMENT:   2   1   NICOLSON, JAMES
ELEMENT:   2   2   4563
ELEMENT:   2   3   80
ELEMENT:   2   4   B

ELEMENT:   3   1   JOHNSON, GEORGE
ELEMENT:   3   2   8521
ELEMENT:   3   3   90
ELEMENT:   3   4   A

ELEMENT:   4   1   SMITH, PATRICK
ELEMENT:   4   2   9632
ELEMENT:   4   3   60
ELEMENT:   4   4   C-

ELEMENT:   5   1   YANBLOWSKI, DICK
ELEMENT:   5   2   8745
ELEMENT:   5   3   50
ELEMENT:   5   4   D

LAST ITEM ENTERED
```

Program 4

Title: **Library Catalog**
Author: J.L. Cornellisson
　　　　U.S.B.M.
　　　　Lakewood, CO
Memory Requirement: 16K
Statements: 189
Files: 1 ASCII Program
　　　　Requires dedicated data tape

This program organizes articles from scientific and engineering journals although it can be used in any field. It is similar to a card catalog of a library. Each "reference card" is stored in a file on magnetic tape; each file contains 15 cards.

The user may then search the entire catalog or a part of the catalog. The program searches through the files for a key word or a phrase that is specified by the user. The 4050 System then lists on the screen all reference cards that contain the key word or phrase.

This software helps you organize and store information as well as put the information to work by summarizing it in a more effective tabular form.

No provision is made for correcting existing entries.

```
Enter 0 to stop entry
$ INPUT TITLE-LINE 1
EFFECTS OF WEATHERING ON MNIE AIR
% INPUT TITLE-LINE 2

INPUT AUTHOR(S)
BRUZEWSKI, R.G. AND AUGHENBAUGH, N.B.
ENTER PUBLISHING INFORMATION - LINE 1
MINING CONGRESS JOURNAL, SEPT. 1977, PP 23-25
ENTER PUBLISHING INFORMATION - LINE 2

ENTER SEARCH WORDS - LINE 1
DENTILATION, ROCK MECHANICS, WEATHER EFFECTS
ENTER SEARCH WORDS - LINE 2

ENTER REFERENCE FILE NUMBER (RF. 0X-XX)
RF. 07-07

  IS DATA CORRECT? TITLE(1), AUTHOR(2), PUBLISHING INFO(3)
KEY WORDS(4), OR REF. NO. (5)? 1
INPUT TITLE LINE 1
EFFECTS OF WEATHERING ON MIME AIR
INPUT TITLE LINE 2

IS EVERYTHING O.K.? (YES=1, NO=2) 1




DO YOU WISH TO:

  ENTER DATA---1
  SEARCH DATA--2
  END---------3

INPUT CHOICE NOW 1

  START NEW FILE (1)
or CONTINUE TO FILL PARTIALLY FILLED FILE (2) 1

FILE NUMBER OF NEW FILE 8
```

Program 5

Title: **Publication Distribution**
Author: David A. Beginski
Micro-Rel, Inc.
Tempe, AZ
Memory Requirement: 16K

Statements: 296
Files: 1 ASCII Program
Requires dedicated tape

The Publication Distribution program will accept 100 publications with 24 subscribers per publication. Selection of publications in any order or quantity may be made and printed on the 4050 screen. Changes may be made on any number of publications and/or subscribers. A continuous copy feature is available to print out subscribers' name on the publications selected.

The Publication Distribution program will be used most effectively for magazine distribution in a company of 400 employees or less.

```
ADMINISTRATIVE MANAGEMENT

ROBERT COOK          ALEXANDER MARKS    *                    *
JOHN ANDERSON        SCOTT O RILEY      *                    *
RON COOKER           *                  *                    *
DAVID JONES          *                  *                    *
MIKE KEATON          *                  *                    *
WALTER LAMBERT       *                  *                    *

ELECTRONIC NEWS

TOM HOWARD           *                  *                    *
KEN JONES            *                  *                    *
LEON LAWSON          *                  *                    *
*                    *                  *                    *
*                    *                  *                    *

ELECTRONICS I

MARK WILLIAMS        *                  *                    *
*                    *                  *                    *
*                    *                  *                    *
*                    *                  *                    *
*                    *                  *                    *

ELECTRONICS II

JAMES MURRAY         *                  *                    *
*                    *                  *                    *
*                    *                  *                    *
*                    *                  *                    *
*                    *                  *                    *
```

Program 6

Title: **Inventory File System**
Author: John R. Zeigler
Tektronix, Inc.
Wilsonville, OR
Memory Requirement: 32K
Peripherals: Optional-4641 Printer
Statements: 384
Files: 1 ASCII Program
Requires dedicated tape

The program implements a small inventory system. You can create files of various items where each item is composed of a part number, quantity, location, description, and cost. Each data file is assigned a name which is kept in file 14, thus forming a directory to the inventory.

Data files may be modified in any of the five fields: part number, quantity, location, description, or cost. User-Definable Keys allow you to sort files, update files to tape, display the file, display the next line of a file, type the file to the 4641 printer, search the entire file listing for each occurrence of a desired string in a particular field, search for a part number and stop, modify a data entry, open a file, and create the directory.

A unique feature of the Inventory File System is that the directory may be accessed just as any data file. This means you can delete a file even though no User-Definable Key is provided for the task. The extra effort required to create the directory and to delete files assures that files won't be inadvertently deleted.

```
Dump of file "LIBRARY"

Part#        Quan Location Description                         Cost

51/00-0100   20   61-181   PROJECT HOURS DATA MAINTENANCE      $15.00
51/00-0101   20   61-181   ENGINEERING EXPENSES DATA MAINT     $15.00
51/00-0301   20   61-181   AVERAGE ELASTICITY OF DEMAND        $15.00
51/00-0401   20   61-181   ARBITRAGE                           $15.00
51/00-0501   20   61-181   INVENTORY/PRODUCTION MODELING       $15.00
51/00-0601   20   61-181   CHECK BOOK BALANCING                $15.00
51/00-0602   20   61-181   REQUIRED BANK RESERVE               $15.00
51/00-0701   20   61-181   MOVING AVERAGE                      $15.00
51/00-0702   20   61-181   SINGLE MOVING AVERAGES W/GRAPHICS   $15.00
51/00-0703   20   61-181   DOUBLE MOVING AVERAGES W/GRAPHICS   $15.00
51/00-0704   20   61-181   SINGLE EXPONENTIAL SMOOTH W/GRAPH   $15.00
51/00-0705   20   61-181   DOUBLE EXPONENTIAL SMOOTH W/GRAPH   $15.00
51/00-0706   20   61-181   TRIPLE EXPONENTIAL SMOOTH W/GRAPH   $15.00
51/00-0707   20   61-181   SINGLE WEIGHTED AVERAGES W/GRAPH    $15.00
51/00-0708   20   61-181   DOUBLE WEIGHTED AVERAGES W/GRAPH    $15.00
51/00-0709   20   61-181   PETROLEUM RISK ANALYSIS I           $15.00
51/00-0710   20   61-181   PETROLEUM ECONOMIC ANALYSIS I       $15.00
51/00-0711   20   61-181   PETROLEUM WATER INFLUX I            $15.00
51/00-0712   20   61-181   OIL RESERVES                        $15.00
51/00-0713   20   61-181   GAS RESERVES                        $15.00
51/00-0714   20   61-181   TIME LAPSE ANALYSIS                 $15.00
51/00-0715   20   61-181   MEASURES OF CENTRAL TENDENCY        $15.00
```

Program 7

Title: **Grade Recorder**
Author: P.J. Fulford
Purdue University
West LaFayette, IN
Memory Requirement: 32K
Peripherals: 4051R05 Binary ROM
Optional-4662 Plotter
Statements: 775
Files: 1 ASCII Program
2 Binary Program
Requires dedicated tape

A teacher's course grade book is automatically set up and maintained on tape. Maximum limits are approximately 70 students, 20 grades and 20 courses, but these may be easily changed. Computation of averages, standard deviations, and weighted composite totals are features of the program. Sorting by rank and name are also available.

Grades may be added, deleted or changed. Distributions are graphically displayed as a histogram.

A dedicated tape is presumed with the program as the first three files. The first file is a short ASCII program to call the Binary loader for the second file. The second file then links the third. The remaining portion of the tape is used for the binary data. The data files are automatically marked as needed.

```
LIST OF COURSE  DATA ON THIS TAPE
NO FILES ON TAPE
      END OF LIST OF FILES
   DATA FOR A COURSE NOT LISTED SHOULD BE SAVED ON FILE 4
FILE 4 HAS BEEN PREPARED -USE IT TO STORE DATA
ENTER either : the file number for an existing course data set
       or : "NEW"   - to start a new file
       or : "STOP"  - to end session
NEW

   ENTER the name of the new course :ENGLISH 111
   What is the instructor's name :JOHNSON
ENTER student list;proper names firstone per line. End list with LAST
   NAME (Enter "*" to correct previous name)  NAME CHECK_____
LANNIE WANG                                  *LANNIE WANG*
PATRICK SILVERS                              *PATRICK SILVERS*
LANORA SPRING                                *LANORA SPRING*
JANICICE LINK                                *JANICICE LINK*
*                                            *X*
Name to be corrected                         JANICICE LINK
JANICE LINK                                  *JANICE LINK*
JIM KELLY                                    *JIM KELLY*
LAST                                         *LAST*

Number of names on list :5

REMEMBER,THE FILE TO SAVE DATA ON IS 4

Please wait for a moment
```

```
         ENTER THE NUMBER CORPESPONDING TO THE MENU ITEM WANTED
1.DISPLAY THE STUDENT NAMES  2.PRINT OUT DATA ON PLOTTER
3.ENTER A GRADE SET (OR SETS) 4.DISPLAY GRADES
5.COMPUTE FINAL GRADES        6.ADD/CHANGE/DELETE DATA
7.STORE DATA ON TAPE          8.GET DATA FROM TAPE
9.PLOT THE GRADES FROM 3 OR 4 OR 5 (PREVIOUS MENU ITEM)
      (EITHER ON THE SCREEN OR ON THE PLOTTER)
10. END SESSION

      Enter menu number or "M" for new menu
```

Program 8

Title: **Print Mail Addresses and Form Letters**

Author: Nick Fkiaras
Tektronix, Inc.
Wilsonville, OR

Memory Requirement: 24K
(32K is recommended)

Peripherals: 4641 Printer

Statements: 713

Files: 3 ASCII Program
Requires dedicated tape

Program One: Form Letter Text Entry

The user enters the text of a form letter and saves it on file 3 of the same tape. The letter can have several pages, which are numbered automatically. The text may be edited by adding, inserting, deleting and replacing lines. Once the letter has been composed and edited, it can be printed using the second program in this package.

The user may have the same salutation printed automatically for every addressee (entered and saved with the text of the letter) or he may enter it himself for each addressee as the letters are being printed.

Program Two: Enter Labels and Print Labels/Form Letter

This program allows the user to enter any number of mail addresses; the program automatically MARKs a file and saves the addresses. They may be recalled later and printed on "Pin Feed Labels" with a TEKTRONIX 4641 Printer. Each mail address can have up to five lines. Each line can be up to 32 characters long.

The user can edit his "mail address" files by deleting any number of mail addresses from them and by changing, replacing, inserting or deleting lines from each mail address. A permanent record of all files may be made by printing them on the 4641 printer using regular printer paper (132 columns).

Finally, the program will print form letters using the mail addresses and the text entered and saved by program one. More than one "mail address" file may be used.
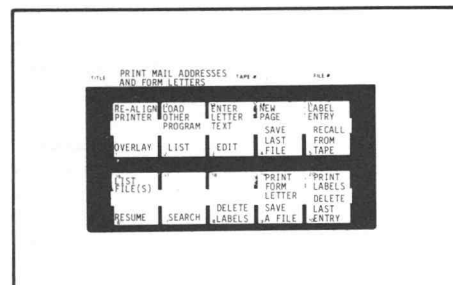
Program 9

Title: **$EDIT.DOS**

Author: John Carter
Tektronix, Inc.
Santa Clara, CA

Memory Requirement: 64K

Peripherals: Optional — 4907 File
Manager
4924 Tape Drive
4641 Printer

Statements: 1415
8,000 bytes binary data

Files: 1 ASCII Program (Autoload)
8 Binary Program
3 Binary Data
Requires dedicated tape or disk

$EDIT.DOS is a 4907 disk oriented screen editor for the 4052/54. However it may be used with cartridge tape. It creates free style, line oriented text enabling you to produce reports, manuscripts, form letters and so on. Its features are:

1. Two edit buffers for manipulating lines of text.
2. Complete INPUT and OUTPUT file handling for extra long text.
3. Fast and easy movement of the line pointer and character pointer back and forth through the text.
4. FIND and AGAIN which locates any string of characters in a line.
5. Five ways to do a REPLACE function.
6. Panic abort from long processes.
7. Single letter command entry.
8. Multiple commands per line of input plus REPEAT.
9. STATUS report on current editor environment.
10. LIST to any peripheral or device with or without line reference numbers.
11. Exit from program without disturbing open files or contents of buffers. Recover to $EDIT.DOS prompt.
12. Write over or append to the output file.

The $EDIT.DOS commands are:

A-gain	I-nsert	R-eplace
B-ottom	K-ill	S-ave
C-lear	L-ist	T-ag
D-own	M-acro	T-op
F-ind	O-ld	U-p
G-et	P-ut	V-erify
H-elp	Q-uit	X-change

Two special commands, "<" and ">", move the character pointer left or right through the current line. Another feature uses the vertical bar, "|", for repeating EDIT comands.

In addition to the keyboard commands there are 10 defined function keys for STATUS, RECOVERY, VERIFY ON/OFF, MERGE LINES, SPLIT LINES, PANIC STOP, RULER, CHANGE EDIT DELIMITER, REPEAT LAST EDIT COMMAND, and OLD "$FORMAT".

A complete HELP message file is included and should be sufficient for using the program at 95% efficiency on the first try.

Program $FORMAT has been modified to run with $EDIT.DOS to format and justify the edited text.

This text was created by $EDIT.DOS. Later $FORMAT.DOS. was used to produce the output.
The asterisk is the EDIT prompt. T moves the pointer to the top. L15 says to list 15 lines. The "up arrow" shows where the current character point is and the > shows the location of the line pointer.

Program 10

Title: $FORMAT

Author: Bruce Clarkson
        Science Applications, Inc.
        Raleigh, NC
Revised by: John R. Carter, Sr.
        Tektronix, Inc.
        Santa Clara, CA
Memory Requirement: 16K
Peripherals: 4051R06 Text Editor ROM
        or
        Program $EDIT. DOS
        Printer
        Optional—4907 File
                Manager
                4924 Tape Drive
Statements: 525
Files: 1 ASCII Program

$FORMAT provides formatted text output similar to the University of Waterloo's SCRIPT program for the System/360. Commands are imbedded in the source text file at the time of creation — typically with the TEKTRONIX Editor ROM or with Applications Library program $EDIT.DOS.

$FORMAT prompts for additional parameters relative to the page layout at execution time. The commands in the source file combined with these parameters give control over the format of the printed document.

Options include:
  right margin justification (padding with blanks)
  page size
  page numbering
  indentation
  spacing
  centering
  and other refinements

The modifications to the original (Text Formatting) allow input from a 4907 File Manager in ASCII or Binary, and text file creation using $EDIT.DOS. Output may be to any peripheral or device, including the 4050 screen.

Program 11

Title: **Bibliography Management & Search**

Authors: K. Ho and G. Tzitzikalakis
        Columbia University
        Dept. of Orthopedic Surgery
        New York, NY
Peripherals: Optional-4662 Plotter
Memory Requirement: 24K
Statements: 623
Files: 2 ASCII Program
      1 ASCII Text (example)
      Requires dedicated tape

These programs store, review and retrieve bibliographical references on tape.

Management Program

The program numerically sequences the references in the order entered. Data items comprises the reference:

    author's name (72 char)
    title   (144 char)
    source   (144 char)
    content   (216 char)

Content contains the keywords which will be used in a search.

You may review or correct any of the references stored on type by responding with the reference number when prompted.

The data files may reside on the same tape as the program files or a separate tape. However, the tape from the first data file to the last must be dedicated to this program since the Management Program automatically MARKs files as needed and maintains a numeric sequence throughout.

A mnemonic menu drives the routines:

  ENT — search the last reference on tape, get and store new references one by one
  REV — search the designated reference and print out
  COR — calculate the file number of the designed reference, store the file's data in a string X$, correct the designated reference and store string X$ onto the same file
  SEA — OLD the "SEARCH" program for retrieval of references
  MEN — print list of Mnemonics
  TER — end execution

Search Program

This program will search the references stored on a tape by the Management Program. The search may be based on keyword(s) in the content data item, or on the author(s) name. Once you choose the search mode, you will be prompted for the keyword(s). Only when the content keyword(s) or the author(s) — depending on the mode chosen — satisfy all keyword(s) input, will the reference be retrieved.

The retrieved references may be printed to the screen or plotter, stored on tape, or refined and stored on a different tape.

A mnemonic menu drives the routines:

  KEY — search and retrieve references with keywords on content
  AUT — search and retrieve references with keywords on author
  REF — search and retrieve references stored on tape from previous searches, with a different set of keywords on content or author
  TAP — store retrieved references on tape
  SCR — print retrieved references on screen
  PLO — print retrieved references on output device (plotter)
  CON — continue the search that was stopped due to memory space
  MEN — print list of Mnemonics
  MAN — OLD "MANAGEMENT" program and execute it
  TER — end execution of program

An example of data file is included with the two programs.

Program 12

Title: **Micro-Grasp**
Author: Roger W. Bowen
U.S. Geological Survey
Reston, VA
Memory Requirement: 32K
Statements: 1135
Files: 3 ASCII Program
4 ASCII Date (examples)
Requires dedicated tape

Micro-Grasp is a scaled down version of the USGS Geologic Retrieval and Synopsis Program (GRASP). The GRASP system is extensively used on a variety of small to large scale hosts to access many diverse types of data. Micro-Grasp retains the major features of GRASP and should provide useful on private (or non-shared) databases of a small to medium size (less tha 300K bytes). Micro-Grasp is a command-oriented system which operates on fixed-field character and/or numeric data in a tabular form.

Each database consists of a data definition file and a master file. The data definition file describes the master file. The data definition files contains the number of fields in a master-file record, the number of characters in a master-file record and the number of the master file. This is followed by 'n' field-description records. Each field-description record has a field name, data type, beginning position, and optional ending position.

The master file contains the actual AS-CII data. Data may be numeric or character and must be in a fixed field format.

Twelve commands operate on the data in the data-definition files and the master files:

Help: displays a list and shor description of each of the commands.

File: establishes or changes a data definition file.

Name: outputs the data definition file to screen or a selected tape file.

Inpu(t): creates a master file in prompted mode.

Cond(ition): enters or adds a set of conditions using valid field names and their relation (equal, less than, greater than, less than or equal to, greater than or equal to, not equal to, or contains string) to a value (blank, numeric or character string) on which to select data.

Logi(c): completes selection criteria by combining conditions (entered earlier) with the logical operators: and, or, not.

Defi(ne): defines new variables which remain in effect until a new master files is selected.

List: displays selected fields for each record which satisfies the selection criteria (conditions and logic).

Revi(ew): displays the number of the master fiel, the field names being listed, current conditions and logic expressions used in the listing.

Stat(istics): calculates statistics (minimum, maximum, sum, mean, variance, standard deviation) for each specified numeric field.

Util(ity): provides copy, tlist, mark, print and input.

Quit: exits Micro-Grasp.

TEXT PROCESSING D1
062-5970-01

TEXT PROCESSING D1 is a disk collection of programs to help you with various clerical tasks such as:

- Text Entry/Editing/Formatting/ Storage/Printing
- Mailing Label Data Base Maintenance/Printing
- Recording/Cataloging/Inventory

Each of the programs maintains data files, and must be transferred to its own dedicated disk. Documentation for each details the steps to transfer the programs to separate disks.

Title/
Previous Abstract #

Coin Collection Inventory
51/07-8042/0
Recordkeep II
51/07-6108/1
Journal Entry, Edit, Review & Search
51/07-6114/0
4907 File Manager Based Mailing List
51/07-8019/0
$EDIT.DOS
51/07-8038/0
$FORMAT
51/07-8018/1

Program 1

Title: **Coin Collection Inventory**

Author: Peter R. Hulick
           Lynchburg, VA
Memory Requirement: 32K
Peripherals: 4907 File Manager
Statements: 354
Files: 1 Program
           Requires disk data files

The program is used to create and maintain an inventory for a coin collection. A file is created for each series of coins, one record contains each coin. The first record of each series contains the name of the series, denomination and number of items. Files may be reviewed, updated, corrected and tabulated.

The following options are available:

1. Review of a series of coins

   Calls up a file of coins, displays the contents, tabulates and prints out the coins' values.

2. Add a new series of coins

   35 series of coins and suggested file identifiers are assigned in the program. These may be modified, added to or deleted.

3. Change an existing series of coins

   Allows the correction of a coin in a series.

4. Update the prices of an existing series

   Allows periodic updates of values of coins in a series.

5. Sum the values of all series currently on disk

   Lists all current series, each series total value, and the sum total of all series' values.

6. Add to a current series

   Allows the user to lengthen a series of coins that has been previously created.

About 3000 coins may be stored on a disk.

```
PROGRAM TO INVENTORY COIN COLLECTION
SELECT ONE OF THE FOLLOWING AND HIT RETURN KEY

    1  REVIEW OF A SERIES OF COINS
    2  ADD A NEW SERIES OF COINS
    3  CHANGE AN EXISTING SERIES OF COINS
    4  UPDATE THE PRICES OF AN EXISTING SERIES
    5  SUM THE VALUES OF ALL SERIES CURRENTLY ON DISK
    6  ADD TO A CURRENT SERIES

    YOUR CHOICE: _
```

```
### SERIES NAME                   FILE IDENTIFIER

 1 TEST SERIES OF DIMES            TEST10
 2 MISC HALF CENTS                 MISHAFCENT
 3 MISC LARGE CENTS                MISLRGCENT
 4 MISC 3 CENT PIECES              MISC3CENT
 5 MISC 5 CENT PIECES              MISC5CENT
 6 MISC HALF DIMES                 MISHAFDIME
 7 MISC DIMES                      MISDIMES
 8 MISC 20 CENT PIECES             MIS20CENT
 9 MISC 25 CENT PIECES             MIS25CENT
10 MISC 50 CENT PIECES             MIS50CENT
11 MISC SILVER DOLLARS             MISSILVDOL
12 US $1 GOLD                      USGOLD1
13 US $2-1/2 GOLD                  USGOLD2HAF
14 US $3 GOLD                      USGOLD3
15 US $5 GOLD                      USGOLD5
16 US $10 GOLD                     USGOLD10
17 US $20 GOLD                     USGOLD20
18 MEXICO 50 PESO GOLD             MEXGOLD50P
19 MEXICO 2 PESO GOLD              MEXGOLD2P
20 CANADA SOVEREIGN GOLD           CANGOLDSOV
21 MISC SMALL CENTS                MISCENTS
22 BUFFALO NICKELS                 BUFF5
23 JEFFERSON NICKELS               JEFF5
24 BARBER DIMES                    BARBER10
25 MERCURY DIMES                   MERCURY10
26 ROOSEVELT DIMES                 ROOS10
27 BARBER QUARTERS                 BARBER25
28 STANDING LIB. QUARTERS          STGLIB25
29 WASHINGTON QUARTERS             WASH25
30 BARBER HALVES                   BARBER50
31 WALKING LIBERTY HALVES          WALKING50
32 FRANKLIN HALVES                 FRANKLIN50
33 KENNEDY HALVES                  KENNEDY50
34 MORGAN SILVER DOLLARS           MORGAN100
35 PEACE DOLLARS                   PEACE100

ENTER FILE IDENTIFIER DESIRED
```

Program 2

Title: **RECORDKEEP II**

Memory Requirement: 16K

Peripherals: 4907 File Manager
Optional-4641 Printer

Statements: 2034
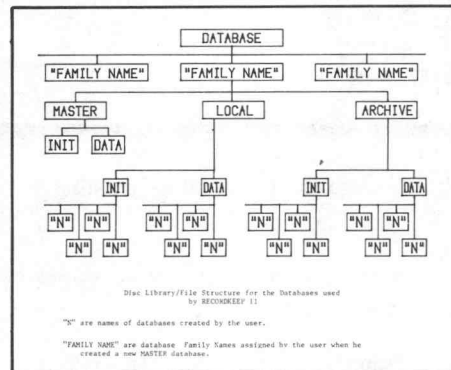
Files: 14 Program
Requires disk data files

RECORDKEEP II allows storing tables and lists on the 4907 File Manager. Reports can be quickly generated from this table (database) through the RECORDKEEP II commands that allow editing, sorting, and table listing.

Twelve commands are available. They are broken down into three functional groups. The first group provides the commands necessary to edit the database. Commands in the second group include file management operations that allow saving databases and creating smaller tables from existing databases. These tables can be sorted and listed to emphasize their content by the third functional group. RECORDKEEP II is useful for storing and manipulating small inventories, sales history records, personnel records, patient history, or catalogs.

Recordkeep II instructs you step-by-step on writing overlays to perform special-ized tasks. Also included are several utility subroutines.

No provision for correcting existing en-tries.

Command 1—Add Items to Database
Command 2—Delete items From Data-base
Command 3—Modify Items in Data-base
Command 4—List a Database
Command 5—Create a Local Data-base
Command 6—Archive a Local Data-base
Command 7—Make Local Databases From Archive
Command 8—List Directory
Command 9—Delete Archived Data-base
Command 10—Sort a Database
Command 11—List Database With Sub-totals
Command 12—Stop

Disc Library/File Structure for the Databases used by RECORDKEEP II

"N" are names of databases created by the user.

"FAMILY NAME" are database Family Names assigned by the user when he created a new MASTER database.

Program 3

Title: **Journal Entry, Edit, Review & Search**

Author: Peter R. Hulick, M.D.
Lynchburg General Hospital
Lynchburg, VA

Memory Requirement: 16K

Peripherals: 4907 File Manager

Statements: 386

Files: 2 Program
Requires disk data files

The first program is Journal Entry, Edit and Review. This program prompts the user to enter onto disk storage the following:

1. Title (72 characters)
2. Principal author (40 characters)
3. Year of publication
4. Name of journal (50 characters)
5. Up to eight retrieval categories per article

Each article is stored in a 400 byte record on the disk, allowing the storage of 1500 records on one disk. The program allows retrieval of the data and updating or revision of articles previously entered.

The second program is Journal Search. This program will search the articles stored on the disk using one of the following formats:

1. Selected retrieval categories (up to 86)
2. Listing in numerical order of all re-trieval categories
3. Listing of all articles on the disc by record number

Articles retrieved are displayed on the screen and automatically copied on the 4631 Hard Copy Unit when the screen is full or the search ends.

Program 4

Title: **4907 File Manager Based Mailing List**

Author: Brian Diehm
Tektronix, Inc.
Wilsonville, OR

Memory Requirement: 16K

Peripherals: 4907 File Manager
Optional-4641 Printer
(Recommended)

Statements: 16K (463)
32K (472)

Files: 2 Program
Requires dedicated disk

This program uses the 4907 FILE MANAGER to maintain and print mailing lists for up to 50 different publications. Subscribers to all the lists are drawn from a single master subscriber file. Provision is included to add, delete, edit and list subscribers or subscriber groups by a last name key. Up to four lines of address information may be used.

The publication file consists of 1—50 publication names. The subscribers file consists of all the subscribers in alphabetical order by last name key. Each is contained in a 30 character by 5 line matrix.

Name (30 characters)
4 address lines (30 characters each, except last line of 25 characters)
Zip code (5 characters of last address line)
List of publications subscribed to

Output files may be created for any of the publications, and this file is in zip code order. This file may be used by the program to drive the 4641 Printer to print a mailing list of stick-on labels.

Two versions of the program are included. The minimum configuration version is the only one that can be used on 16K machines. This version may also be best suited to very large output files, as the only limitation to their size is available disc space. The second version runs faster when creating output files by keeping a copy of the file's link pointers in memory. This nets a 40% reduction of time required to create output files. However, the length of output file that may be created is limited by the memory available to store the links. For a 32K 4050, up to 1000 entries may be filed; for a 24K machine, up to 500 entries may be filed.

In both versions, the size of the subscriber file is limited only by the available disc space.
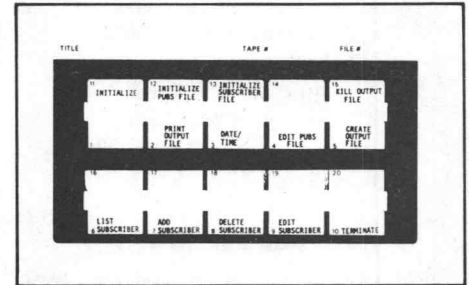
Program 5

Title: **$EDIT.DOS**

Author: John Carter
Tektronix, Inc.
Santa Clara, CA

Memory Requirement: 64K

Peripherals: Optional — 4907 File Manager
4924 Tape Drive
4641 Printer

Statements: 1415
8,000 bytes binary data

Files: 8 Program
2 Data
Requires dedicated disk

$EDIT.DOS is a 4907 disk oriented screen editor for the 4052/54. However it may be used with cartridge tape. It creates free style, line oriented text enabling you to produce reports, manuscripts, form letters and so on. Its features are:

1. Two edit buffers for manipulating lines of text.
2. Complete INPUT and OUTPUT file handling for extra long text.
3. Fast and easy movement of the line pointer and character pointer back and forth through the text.
4. FIND and AGAIN which locates any string of characters in a line.
5. Five ways to do a REPLACE function.
6. Panic abort from long processes.
7. Single letter command entry.
8. Multiple commands per line of input plus REPEAT.
9. STATUS report on current editor environment.
10. LIST to any peripheral or device with or without line reference numbers.
11. Exit from program without disturbing open files or contents of buffers. Recover to $EDIT.DOS prompt.
12. Write over or append to the output file.

The $EDIT.DOS commands are:

A-gain	I-nsert	R-eplace
B-ottom	K-ill	S-ave
C-lear	L-ist	T-ag
D-own	M-acro	T-op
F-ind	O-ld	U-p
G-et	P-ut	V-erify
H-elp	Q-uit	X-change

Two special commands, "<" and ">", move the character pointer left or right through the current line. Another feature uses the vertical bar, "|", for repeating EDIT comands.

In addition to the keyboard commands there are 10 defined function keys for STATUS, RECOVERY, VERIFY ON/OFF, MERGE LINES, SPLIT LINES, PANIC STOP, RULER, CHANGE EDIT DELIMITER, REPEAT LAST EDIT COMMAND, and OLD "$FORMAT".

A complete HELP message file is included and should be sufficient for using the program at 95% efficiency on the first try.

Program $FORMAT has been modified to run with $EDIT.DOS to format and justify the edited text.

This text was created by $EDIT.DOS. Later $FORMAT.DOS. was used to produce the output.
The asterisk is the EDIT prompt. T moves the pointer to the top. L15 says to list 15 lines. The "up arrow" shows where the current character point is and the > shows the location of the line pointer.

Program 6

Title: **$FORMAT**

Author: Bruce Clarkson
Science Applications, Inc.
Raleigh, NC

Revised by: John R. Carter, Sr.
Tektronix, Inc.
Santa Clara, CA

Memory Requirement: 16K

Peripherals: 4051R06 Text Editor ROM

or

Program $EDIT. DOS
Printer
Optional—4907 File
Manager
4924 Tape Drive

Statements: 525

Files: 1 ASCII
Requires dedicated disk

$FORMAT provides formatted text output similar to the University of Waterloo's SCRIPT program for the System/360. Commands are imbedded in the source text file at the time of creation — typically with the TEKTRONIX Editor ROM or with Applications Library program $EDIT.DOS

$FORMAT prompts for additional parameters relative to the page layout at execution time. The commands in the source file combined with these parameters give control over the format of the printed document.

Options include:
right margin justification (padding with blanks)
page size
page numbering
indentation
spacing
centering
and other refinements

The modifications to the original (Text Formatting) allow input from a 4907 File Manager in ASCII or Binary, and text file creation using $EDIT.DOS. Output may be to any peripheral or device, including the 4050 screen.

UTILITIES T1
062-5974-01

UTILITIES T1 supports a wide variety of utilitarian functions such as duplicating tapes/disks, tracking offline storage, recovering program files, converting graphic data and non-Tektronix BASIC programs. One program draws a monthly calendar, another helps you document your 4050 Series Applications Library programs. This collection will help you streamline miscellaneous chores. The individual abstracts describe each program.

One of the programs must be transferred to its own dedicated tape. Two of the programs must be transferred to their own respective disk. The documentation provides complete instructions for accomplishing the transfers.

**Title/
Previous Abstract #**

Tape Duplication
51/00-8011/0

4924 Mass Tape Duplication
51/00-8023/0

Binary Data File Duplicator
51/00-8041/0

Program File Recovery
51/00-8014/0

Automatic Hardcopy File Listings
51/00-8037/0

Plot 10 to GDU Graphic Data Converter
51/00-9542/0

Calendar Generator
51/00-9526/0

TEKNIQUES
51/00-6005/0

4907 Utility
51/00-8025/0

Mass Storage Management System
51/00-6112/0

Disk-to-Tape Backup/Restore Utilities
51/07-8048/0

WANG 2200 to 4050 Conversion Guide
51/00-7001/0

HP9830 to 4050 Conversion Guide
51/00-7002/0

Program 1

Title: **Tape Duplication**
Author: T.F. Schatzki
Research Leader
U.S.D.A.
Western Regional Research Lab
Berkeley, CA
Memory Requirement: 8K
Peripherals: 4924 Tape Drive
Statements: 116
Files: 1 ASCII Program

This program copies any standard format tape onto another tape with minimum operator attention, starting with X on source tape and file Y on target tape. (X and Y are INPUT from keyboard.) The program preserves file order and all header information. No premarking is required on target tape.

The source tape is placed in the 4924 Tape Drive, the target tape in the 4050 drive.

```
PROGRAM TO COPY COMPLETE TAPES FROM 4924 TO 4051

WRITTEN BY T. SCHATZKI, USDA-WEST.REG.RES.LAB.,BERKELEY,CA

LIMITED TO TAPES HAVING ASCII,BINARY,NEW AND LAST FILES
 CONTAINING NO STRINGS LONGER THAN MACHINE SIZE - 6700
STANDARD FORMAT (256 BYTE REC.,HEADER,CHECKSUM) ASSUMED


REMOVE PROGRAM TAPE FROM 4051
TURN ON 4924

LOAD SOURCE TAPE IN 4924. MAY BE WRITE PROTECTED
TO COPY ENTIRE TAPE IN 4924 TYPE "0","RETURN"
TO COPY STARTING WITH FILE X TYPE "X","RETURN" 2

LOAD UNPROTECTED TARGET TAPE IN 4051. NEED NOT BE MARKED
TO REWRITE ENTIRE TAPE IN 4051 TYPE "0","RETURN"
TO APPEND STARTING WITH FILE X TYPE "X","RETURN" 0

TAPE IN 4924 STARTING AT FILE 2 WILL BE COPIED ONTO
TAPE IN 4051 STARTING AT FILE 1, KILLING ALL FURTHER FILES
PLEASE VERIFY (YES OR NO) YES
```

Program 2

Title: **4924 Mass Tape Duplication**
Author: Ed Mitchell
Tektronix, Inc.
Wilsonville, OR
Memory Requirement: 16K
Peripherals: Two 4924 Digital Cartridge
Tape Drives
Optional-Up to 15 4924's
Statements: 202
Files: 1 ASCII Program

Use the 4924 Mass Tape Duplication program to duplicate up to 14 copies of a tape at a time.

The program uses one 4924 for the Master copy, and from one to fourteen 4924's for slaves.

Read-after-write mode is used on the slave 4924's. Slaves detecting errors in duplication "drop out" so as not to stop total duplication. A status report is printed at the end of duplication informing the operator which tapes are good and which are bad. Files are marked the same length as those on the master and the header records are copied, to give an exact copy of the master tape. WBYTE on the 4050 is used to operate all drives simultaneously. ASCII SECRET programs cannot be duplicated.

Program 3

Title: Binary Data File Duplicator

Authors: R. Molins
Y. Juguet
National Polytechnic Institute
Grenoble, France

Memory Requirement: 6K + Data Storage
Statements: 231
Files: 1 ASCII Program
Requires pre-marked file

This program copies the contents of a binary data file into another file, on the same tape or a different one, without using a peripheral device. The program reads the binary data from the file into memory, until the end of the file is reached or memory space is filled.

ASCII characters "/" and "#" are used as logical record separators. The program allows the user to change the separator character if it is already used in the data. The program then reads the binary data from the file into memory. Each logical record is processed one at a time by converting it to an ASCII character string. Each character, if not a separator, is linked to the previous one and so on until a separator is encountered. The separator is deleted after recognition of type of data involved and the resultant string is converted ei-ther into a string or numeric data. The string is then stored on the tape.

Then it searches the target file, and writes each logical record after it recognizes and converts it into a string or a numeric variable. If necessary, this process is repeated until the complete file is duplicated.

The program also allows the user to modify the contents of the file during the process of duplication. The modification can occur in one of two ways:

1. Delete or change a logical record by addressing its assigned number, or

2. Systematically changing or deleting a specified logical record each time it is encountered in the data file.

The program is designed to duplicate binary data files only; it will not process binary program files, or any file type other than binary data.

```
 1    5#
 2    10#
 3    5#
 4    77118#
 5    77118#
 6    77105#
 7    77101#
 8    77118#
 9    77118#
10    77132#
11    77133#
12    77144#
13    7760#
14    77126#
15    77132#
16    77126#
17    77126#
18    77152#
19    77152#
20    77152#
21    77152#
22    77152#
23    7761#
24    77124#
25    77131#
26    77124#
27    77124#
28    77151#
29    77151#
30    77151#
31    77151#
32    77151#
33    7762#
34    77129#
35    77137#
```

```
LOGIC RECORD No 5 IS :  77118

ENTER YOUR CORRECTION !

IF YOU ENTER "~",THE FILE WILL BE CLOSED
                     AND FOLLOWING RECORDS WILL BE LOST.

TAKE CARE, CORRECTION MUST BE A NUMERIC VALUE
```

Program 4

Title: Program File Recovery

Memory Requirement: 8K
Peripherals: 4631 Hard Copy Unit
Statements: 77
Files: 1 ASCII Program
Requires pre-marked file

This program was designed to recover a file which was "lost" due to a user powering up the 4050, inserting a tape, typing FINd (n) and then inadvertently typing SAVe instead of OLD. The program is recovered line by line and written to another file on the same tape as well as printing to the screen and copying. All but approximately eight lines will be recovered with the original statement numbers intact.

The program can also be used to recover program statements which were lost due to other circumstances but the chances of success are smaller.

Program 5

Title: Automatic Hardcopy File Listings

Author: Roger Chan
USV Pharmaceutical Corp.
Tuckahoe, NY

Memory Requirement: 16K
Peripherals: 4631 Hard Copy Unit
Statements: 129
Files: 1 ASCII Program

This program reads any size ASCII tape file program or data and lists it, line by line, on the screen. When the page is full, or last line is encountered, a hard copy on the 4631 is automatically produced. All control char-acters are processed so they will not execute when read and printed to screen. The file numbers are noted on the first page of the listing.

```
TAPE NAME IS TEST FILE NO. IS 1

DISPLAY CHARACTER CR=B

70 REM ##### THIS IS A PROGRAM TO  OUTPUT BEAUTIFUL HARDCOPY FROM #######
80 REM #### THIS IS A PROGRAM TO  OUTPUT BEAUTIFUL HARDCOPY FROM #######
83 REM #### TAPE USING 4051 MACHINE AND A 4631 HARD COPIER #############
85 REM #### THE WHOLE PROCESS IS AUTOMATIC  WITH MINIMUM ATTENTION #####
97 REM #### FROM OPERATOR  AND  IT IS FAST ############################
90 REM #### WRITTEN BY ROGER CHAN ON AUG. 16, 1978: 3 A.M. ############
94 REM
95 REM ######################################################
96 REM
97 REM
98 REM
100 INIT
101 PAGE
105 REM #### A$ IS UNDERSCORE CHARACTER ####
110 A$=CHR(95)
120 B$=" "
130 C$=" "
140 K=1
150 I=0
151 PRINT "PLEASE PUT IN TAPE TO BE PRINT & PRESS RETURN"
152 INPUT B$
153 PAGE
155 REM #### INPUT BEGINNING AND ENDING FILE NO. ####
160 PRINT "STARTING  FROM FILE =";
170 INPUT N
180 PRINT "        END FILE =";
190 INPUT N1
200 F=0
210 DIM L$(99)
215 REM #### SET PAGE FULL CONDITION TO AUTO PAGE AND COPY ####
220 PRINT @32,26:3
```

Program 6

Title: **PLOT 10 to GDU Graphic Data Converter**
Author: Paul J. Kristof
Steve Duncan
Tektronix, Inc.
Wilsonville, OR
Memory Requirements: 16K
Peripherals: 4924 Tape Drive or
4907 File Manager
Statements: 248
Files: 1 ASCII Program
Requires pre-marked data file if
using 4924

The program takes graphic character data (PLOT 10) from a 128 or 256 byte recorded data cartridge, converts it to Tek GDUs (graphic display units), and stores it on an auxiliary tape drive or the 4907 disk unit. This allows plots created on other computer systems to be displayed on the 4050 Series using the MOVE and DRAW commands.

The data can be picked from any file on a 256 byte tape or a 128 byte tape. Data is formatted as follows: if the X value is negative, the data pair is a MOVE. All other values indicate a DRAW command. A sample program is included which will display the plots after they have been converted.

The program compensates for XLOY, so extended addressing data may be converted. However, optimized graphics (see the 4014 manual) cannot be converted using this program.

Alphanumeric data is printed to the 4050 screen during the conversion process, but won't be saved.

Program 7

Title: **Calendar Generator**
Author: LeRoy Nollette
Tektronix, Inc.
Wilsonville, OR
Memory Requirement: 8K
Peripherals: Optional-4662 Plotter
Statements: 84
Files: 1 ASCII Program

This program will draw a calendar one month at a time on either the 4050 screen or on the 4662 Plotter.

The user changes variable "A" in the listing to specify the first day of the week in January. Variable "Y" is the year and variable "T" specifies the output device number.

User-Definable Key 1 switches the output device number between the screen and the Plotter.

Program 8

Title: **TEKNIQUES**
Author: Captain S.K. Sanford
Aberdeen Proving Ground, MD
Memory Requirement: 24K
Peripherals: (2) 4924 Digital Cartridge
Tape Drives
Optional-4631 Hard Copy
Unit
4641 Printer
Statements: 795
Files: 1 ASCII Program
Requires Data Files

The program prompts for documentation fields shown on the standard 4050 Library documentation form, stores variable data, produces 4631 Hard Copy or 4641 Printer

copy. The document may be updated or displayed at a later time from the work tape.

The program is broken into functional modules including:

1. Initialization
2. Directory
3. Generate new document
4. Update old document
5. Display document
6. Print document
7. Document formatter
8. Output routine
9. Input routine

It will accommodate multiple pages of documentation.

Program 9

Title: **4907 UTILITY**
Author: John R. Carter, Sr.
        Tektronix, Inc.
        Santa Clara, CA
Memory Requirement: 8K
Peripherals: 4907 File Manager
Statements: 922
Files: 14 ASCII Program
       40 ASCII Data
       Requires dedicated disk

UTILITY is a tutorial package of routines that offers the new user of a 4907 the ability to learn the machine by example; it teaches the new user how to access the 4907 from the Keyboard or by program control in BASIC.

Not all commands are used in this package as there are some whose inherent simplicity can neither be further simplified nor exemplified. UTILITY details the more difficult commands to remember and use.

Each of the commands used offers two options: 1) how to input the command on the keyboard and 2) how to use the command in a program. There is a HELP routine which reviews all commands in a brief form, gives more detail than the reference guide and less than the reference manual; it is a practical on-line combination of both. For those who cannot remember all of the commands, there is a LIST routine.

The first thing a typical user might want to do is write data into a file and then read it back and later modify it. There are four routines which access any file, or create one, in ASCII or BINARY: 1) Sequential in ASCII; 2) Sequential Binary (will handle numeric and alphanumeric data); 3) Random Access ASCII; and 4) Random Access Binary (will handle alphanumeric only).

Use the reference manual to supplement this guide and for details beyond the scope of this application.

The cartridge tape version builds a disk version with only a few inputs provided by the user.
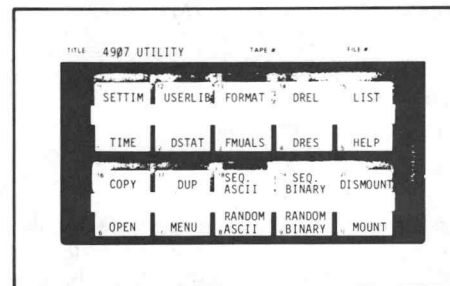
Program 10

Title: **Mass Storage Management System**
Author: Captain S.K. Sanford
        Aberdeen Proving Ground, MD
Memory Requirement: 32K
Peripherals: 4924 Digital Cartridge Tape
             Drive
Statements: 682
Files: 1 ASCII Program
       Requires dedicated tape
       Requires Scratch Tape in 4924

Use this program to track the contents of your mass storage media, specifically cassettes, disks, and reel tapes.

Reports may be generated interactively based on volume ID, media type, availability status, applications, or assigned user. The date of assignment and number of assignments is also recorded.

The program is tutorial.

Title: **Disk-to-Tape Back/Restore Utilities**

Author: John H. Grant
      Tektronix, Inc.
      Seattle, WA

Memory Requirement: 32K

Peripherals: 4907 File Manager

Statements: 821

Files: 8 ASCII Program
      Requires dedicated disk

These utilities allow a user of a 4050/4907 system to archive his disk files onto tape. Specific capability of the utilities include:

All file types supported by the 4907 File Manager may be archived and restored.

Multiple volume backups are supported, i.e., in the event that the information on the disk exceeds the capacity of a single tape, more than one tape will be used.

Directory editing for total backups is supported: files may be omitted from the backup process and file names which require passwords may (must) be modified to include the password.

Selective backups and restores are also supported.

Automatic hard copies of the archived and restored file names may be generated.

The disk-to-disk backup/recovery programs were designed specifically for owners of a single-drive 4907 who need to backup information from their disks.

However, it may also be used in multiple-drive configurations.

The disk-to-tape backup/restore utility contains a program to transfer the remaining programs onto disk.

```
Enter the unit number of the disk drive -- 1

Do you want to backup or restore a disk (B/R)? B

Selective or total (S/T)? T

Insert the disk you would like to backup in drive 1
   and press RETURN:

Insert your disk backup tape (WARNING: any data on
   your tape will be destroyed).  When you are ready
   to continue, press RETURN:

Do you need to edit the directory (Y/N)? Y

The following functions are available:
            1   Directory listing
            2   Directory listing interrupt
            3   Delete directory item
            4   Modify directory item
            5   Edit complete

   Please make your selection via the user definable keys.
*DIRECTORY
               LIB1/PROG2
               LIB1/LIB2/PROG3
               LIB1/LIB2/LIB3/PROG4
               LIB1/LIB2/LIB3/LIB4/PROG5
               SYSLIB/BACKUP
               SYSLIB/BACKUP.B01
               SYSLIB/BACKUP.B02
               SYSLIB/BACKUP.B03
               SYSLIB/BACKUP.R01
               SYSLIB/BACKUP.R02
               SYSLIB/BACKUP.R03
               SCRATCHLIB/ASCRAN
               SCRATCHLIB/PROG1
               SCRATCHLIB/RESTRICTED
               SCRATCHLIB/PROG.TEST
               SCRATCHLIB/BINSEQ1
               SCRATCHLIB/BINSEQ
               SCRATCHLIB/BINRAN1
               SCRATCHLIB/BINRAN
               SCRATCHLIB/ASCSEQ1
               SCRATCHLIB/ASCSEQ
               SCRATCHLIB/ASCRAN1

   Please make your selection via the user definable keys.
*DELETE

      (To terminate DELETE mode, press RETURN when prompted for item.)

   Which item? PROG
   You want to delete LIB1/PROG2 (Y/N)? N
   You want to delete LIB1/LIB2/PROG3 (Y/N)? N
   You want to delete LIB1/LIB2/LIB3/PROG4 (Y/N)? N
   You want to delete LIB1/LIB2/LIB3/LIB4/PROG5 (Y/N)? N
   You want to delete SCRATCHLIB/PROG1 (Y/N)? N
   You want to delete SCRATCHLIB/PROG.TEST (Y/N)? N
      ***PROG not found***
   Which item? PROG1
   You want to delete SCRATCHLIB/PROG1 (Y/N)? Y
      ***DELETED***
   Which item?

   Please make your selection via the user definable keys.
*MODIFY

      (To terminate MODIFY mode, press RETURN when prompted for item.)

   Which item? RESTRICTED
   You want to modify SCRATCHLIB/RESTRICTED (Y/N)? Y
      Enter the correct name: SCRATCHLIB/RESTRICTED:PASSWORD
      ***MODIFIED***
   Which item?

Archived files --
               @LIB1/PROG2
               @LIB1/LIB2/PROG3
               @LIB1/LIB2/LIB3/PROG4
               @LIB1/LIB2/LIB3/LIB4/PROG5
               @SYSLIB/BACKUP
               @SYSLIB/BACKUP.B01
               @SYSLIB/BACKUP.B02
               @SYSLIB/BACKUP.B03
               @SYSLIB/BACKUP.R01
               @SYSLIB/BACKUP.R02
               @SYSLIB/BACKUP.R03
               @SCRATCHLIB/ASCRAN
               @SCRATCHLIB/RESTRICTED:PASSWORD
               @SCRATCHLIB/PROG.TEST
               @SCRATCHLIB/BINSEQ1

The end of the tape has been reached.  Please insert
   another tape and press RETURN to continue:
               @SCRATCHLIB/BINSEQ
               @SCRATCHLIB/BINRAN1

The end of the tape has been reached.  Please insert
   another tape and press RETURN to continue:
               @SCRATCHLIB/BINRAN
               @SCRATCHLIB/ASCSEQ1
               @SCRATCHLIB/ASCSEQ

The end of the tape has been reached.  Please insert
   another tape and press RETURN to continue:
               @SCRATCHLIB/ASCRAN1

   Disk backup completed.
```

Program 12

Title: **WANG 2200 to 4050 Conversion Guide**

Author: Nick Fkiaras
Tektronix, Inc.
Wilsonville, OR

Documentation Only

This instruction manual provides all the information required to convert WANG 2200 programs into 4050 compatible programs. The guide consists of five sections:

1. A hardware description that quickly familiarizes a WANG user with program entering and execution on the 4050.
2. A software section that describes: (a) the programming features unique to WANG, (b) all the language elements identical in name, function, and syntax on both machines, (c) all language elements in WANG that are different than 4050 BASIC in name, function or syntax. In this part the equivalent 4050 functions or a description of a routine to emulate WANG language elements given.
3. A description of how a user can transfer programs from a WANG 2200 to a 4050 via the data communications interfaces available on each machine.
4. Examples.
5. A brief description of how to approach this conversion problem.

This conversion guide is not to be interpreted to be authorization by Tektronix for any user to convert proprietary programs supplied by Wang.

Program 13

Title: **HP9830 to 4050 Conversion Guide**

Author: Nick Fkiaras
Tektronix, Inc.
Wilsonville, OR

Documentation Only

This instruction manual provides all the information required to convert HP9830 programs into 4050 compatible programs. The guide consists of seven sections.

1. A description of all the HP9830 systems covered by this guide.

2. The differences between the 9830 and a 4050 system in features related to entering and running a program.

3. A software section that describes: (a) the programming features unique to HP9830, (b) all the language elements identical in name, function and syntax on both machines, (c) all language elements in HP9830 that are different than 4050 BASIC in name, function or syntax. In this part the equivalent 4050 functions or a description of a routine to emulate HP9830 language elements given.

4. Examples.

5. A description of how a user can transfer programs from an HP9830 to a 4050 via the data communications interfaces available on each machine.

6. All the 4050 features that can be added to a HP9830 program to enhance it.

7. A brief outline of the steps to be taken when converting a program.

This conversion guide is not to be interpreted to be authorization by Tektronix for any user to convert proprietary programs supplied by Hewlett-Packard.

UTILITIES D1
062-5975-01

UTILITIES D1 programs provide a wide variety of functions such as a 4907-4050 tutorial, a 4907-4050 operating system interface, tape/disk duplication, conversion routines, offline storage management, and other utility programs to streamline your miscellaneous chores. The individual abstracts describe each program.

One of the programs must be transferred to its own tape. The documentation provides complete instructions for the transfer.

Title/
Previous Abstract #

Tape Duplication
51/00-8011/0

4924 Mass Tape Duplication
51/00-8023/0

Binary Data File Duplicator
51/00-8041/0

Program File Recovery
51/00-8014/0

Automatic Hardcopy File Listings
51/00-8037/0

Plot 10 to GDU Graphic Data Converter
51/00-9542/0

Calendar Generator
51/00-9526/0

TEKNIQUES
51/00-6005/0

4907 Utility
51/07-8025/0

Mass Storage Management System
51/00-6112/0

Disk-to-Tape Backup/Restore Utilities
51/07-8048/0

WANG 2200 to 4050 Conversion Guide
51/00-7001/0

HP9830 to 4050 Conversion Guide
51/00-7002/0

CDOS 4907 Operating System
51/07-8029/1

Program 1

Title: **Tape Duplication**
Author: T.F. Schatzki
Research Leader
U.S.D.A.
Western Regional Research Lab
Berkeley, CA
Memory Requirement: 8K
Peripherals: 4924 Tape Drive
Statements: 116

Files: 1 Program

This program copies any standard format tape onto another tape with minimum operator attention, starting with X on source tape and file Y on target tape. (X and Y are INPUT from keyboard.) The program preserves file order and all header information. No premarking is required on target tape.

The source tape is placed in the 4924 Tape Drive, the target tape in the 4050 drive.

```
PROGRAM TO COPY COMPLETE TAPES FROM 4924 TO 4051
WRITTEN BY T. SCHATZKI, USDA-WEST.REG.RES.LAB.,BERKELEY,CA
LIMITED TO TAPES HAVING ASCII,BINARY,NEW AND LAST FILES
   CONTAINING NO STRINGS LONGER THAN MACHINE SIZE - 6700
STANDARD FORMAT (256 BYTE REC.,HEADER,CHECKSUM) ASSUMED

REMOVE PROGRAM TAPE FROM 4051
TURN ON 4924

LOAD SOURCE TAPE IN 4924. MAY BE WRITE PROTECTED
TO COPY ENTIRE TAPE IN 4924 TYPE "0","RETURN"
TO COPY STARTING WITH FILE X TYPE "X","RETURN" 2

LOAD UNPROTECTED TARGET TAPE IN 4051. NEED NOT BE MARKED
TO REWRITE ENTIRE TAPE IN 4051 TYPE "0","RETURN"
TO APPEND STARTING WITH FILE X TYPE "X","RETURN" 0

TAPE IN 4924 STARTING AT FILE 2 WILL BE COPIED ONTO
TAPE IN 4051 STARTING AT FILE 1, KILLING ALL FURTHER FILES
PLEASE VERIFY (YES OR NO) YES
```

Title: **4924 Mass Tape Duplication**
Author: Ed Mitchell
Tektronix, Inc.
Wilsonville, OR
Memory Requirement: 16K
Peripherals: Two 4924 Digital Cartridge
Tape Drives
Optional-Up to 15 4924's
Statements: 202
Files: 1 Program

Use the 4924 Mass Tape Duplication program to duplicate up to 14 copies of a tape at a time.

The program uses one 4924 for the Master copy, and from one to fourteen 4924's for slaves.

Read-after-write mode is used on the slave 4924's. Slaves detecting errors in duplication "drop out" so as not to stop total duplication. A status report is printed at the end of duplication informing the operator which tapes are good and which are bad. Files are marked the same length as those on the master and the header records are copied, to give an exact copy of the master tape. WBYTE on the 4050 is used to operate all drives simultaneously. ASCII SECRET programs cannot be duplicated.

Program 3

Title: **Binary Data File Duplicator**
Authors: R. Molins
　　　　　Y. Juguet
　　　　　National Polytechnic Institute
　　　　　Grenoble, France
Memory Requirement: 6K + Data Storage
Statements: 231
Files: 1 Program

This program copies the contents of a binary data file into another file, on the same tape or a different one, without using a peripheral device. The program reads the binary data from the file into memory, until the end of the file is reached or memory space is filled.

ASCII characters "/" and "#" are used as logical record separators. The program allows the user to change the separator character if it is already used in the data. The program then reads the binary data from the file into memory. Each logical record is processed one at a time by converting it to an ASCII character string. Each character, if not a separator, is linked to the previous one and so on until a separator is encountered. The separator is deleted after recognition of type of data involved and the resultant string is converted either into a string or numeric data. The string is then stored on the tape.

Then it searches the target file, and writes each logical record after it recognizes and converts it into a string or a numeric variable. If necessary, this process is repeated until the complete file is duplicated.

The program also allows the user to modify the contents of the file during the process of duplication. The modification can occur in one of two ways:

1. Delete or change a logical record by addressing its assigned number, or

2. Systematically changing or deleting a specified logical record each time it is encountered in the data file.

The program is designed to duplicate binary data files only; it will not process binary program files, or any file type other than binary data.

```
LOGIC RECORD No 5 IS :  77118

ENTER YOUR CORRECTION !

IF YOU ENTER "~",THE FILE WILL BE CLOSED
                AND FOLLOWING RECORDS WILL BE LOST.

TAKE CARE, CORRECTION MUST BE A NUMERIC VALUE
```

```
 1      5#
 2      10#
 3      5#
 4      77118#
 5      77118#
 6      77105#
 7      77101#
 8      77118#
 9      77118#
10      77132#
11      77133#
12      77144#
13      7760#
14      77126#
15      77132#
16      77126#
17      77126#
18      77152#
19      77152#
20      77152#
21      77152#
22      77152#
23      7761#
24      77124#
25      77131#
26      77124#
27      77124#
28      77151#
29      77151#
30      77151#
31      77151#
32      77151#
33      7762#
34      77129#
35      77137#
```

Program 4

Title: **Program File Recovery**
Memory Requirement: 8K
Statements: 77
Files: 1 ASCII Program
　　　　Requires pre-marked file

This program was designed to recover a file which was "lost" due to a user powering up the 4050, inserting a tape, typing FINd (n) and then inadvertently typing SAVe instead of OLD. The program is recovered line by line and written to another file on the same tape as well as printing to the screen and copying. All but approximately eight lines will be recovered with the original statement numbers intact.

The program can also be used to recover program statements which were lost due to other circumstances but the chances of success are smaller.

Program 5

Title: **Automatic Hardcopy File Listings**
Author: Roger Chan
　　　　　USV Pharmaceutical Corp.
　　　　　Tuckahoe, NY
Memory Requirement: 16K
Peripherals: 4631 Hard Copy Unit
Statements: 130
Files: 1 Program

This program reads any size ASCII tape file program or data and lists it, line by line, on the screen. When the page is full, or last line is encountered, a hard copy on the 4631 is automatically produced. All control characters are processed so they will not execute when read and printed to screen. The file numbers are noted on the first page of the listing.

```
TAPE NAME IS TEST FILE NO. IS 1
DISPLAY CHARACTER CR=@

70 REM ###################################################################
80 REM #### THIS IS A PROGRAM TO  OUTPUT BEAUTIFUL HARDCOPY FROM ########
83 REM #### TAPE USING 4051 MACHINE AND A 4631 HARD COPIER ############
85 REM #### THE WHOLE PROCESS IS AUTOMATIC  WITH MINIMUM ATTENTION #####
87 REM #### FROM OPERATOR  AND IT IS FAST #############################
90 REM #### WRITTEN BY ROGER CHAN ON AUG. 16, 1978) 3 A.M. ###########
95 REM ###################################################################
96 REM
97 REM
98 REM
100 INIT
101 PAGE
105 REM #### A# IS UNDERSCORE CHARACTER ####
110 A#=CHR(95)
120 B#=" "
130 C#=" "
140 K=1
150 I=0
151 PRINT "PLEASE PUT IN TAPE TO BE PRINT & PRESS RETURN"
152 INPUT B#
153 PAGE
155 REM #### INPUT BEGINNING AND ENDING FILE NO. ####
160 PRINT "STARTING  FROM FILE ="i
170 INPUT N
180 PRINT "            END FILE ="i
190 INPUT N1
200 F=0
210 DIM L#(99)
215 REM #### SET PAGE FULL CONDITION TO AUTO PAGE AND COPY ####
220 PRINT @32,26:3
```

Program 6

Title: PLOT 10 to GDU Graphic Data Converter
Author: Paul J. Kristof
Steve Duncan
Tektronix, Inc.
Wilsonville, OR
Memory Requirements: 16K
Peripherals: 4924 Tape Drive or
4907 File Manager
Statements: 248
Files: 1 ASCII Program
Requires pre-MARKed data file if
using 4924

The program takes graphic character data (PLOT 10) from a 128 or 256 byte recorded data cartridge, converts it to Tek GDUs (graphic display units), and stores it on an auxiliary tape drive or the 4907 disk unit. This allows plots created on other computer systems to be displayed on the 4050 Series using the MOVE and DRAW commands.

The data can be picked from any file on a 256 byte tape or a 128 byte tape. Data is formatted as follows: if the X value is negative, the data pair is a MOVE. All other values indicate a DRAW command. A sample program is included which will display the plots after they have been converted.

The program compensates for XLOY, so extended addressing data may be converted. However, optimized graphics (see the 4014 manual) cannot be converted using this program.

Alphanumeric data is printed to the 4050 screen during the conversion process, but won't be saved.

Program 7

Title: Calendar Generator
Author: LeRoy Nollette
Tektronix, Inc.
Wilsonville, OR
Memory Requirement: 8K
Peripherals: Optional-4662 Plotter
Statements: 84
Files: 1 Program

This program will draw a calendar one month at a time on either the 4050 screen or on the 4662 Plotter.

The user changes variable "A" in the listing to specify the first day of the week in January. Variable "Y" is the year and variable "T" specifies the output device number.

User-Definable Key 1 switches the output device number between the screen and the Plotter.

Program 8

Title: TEKNIQUES
Author: Captain S.K. Sanford
Aberdeen Proving Ground, MD
Memory Requirement: 24K
Peripherals: (2) 4924 Digital Cartridge
Tape Drives
Optional-4631 Hard Copy
Unit
4641 Printer
Statements: 800
Files: 1 Program
Requires Data Files

The program prompts for documentation fields shown on the standard 4050 Library documentation form, stores variable data, produces 4631 Hard Copy or 4641 Printer copy. The document may be updated or displayed at a later time from the work tape.

The program is broken into functional modules including:

1. Initialization
2. Directory
3. Generate new document
4. Update old document
5. Display document
6. Print document
7. Document formatter
8. Output routine
9. Input routine

It will accommodate multiple pages of documentation.

Program 9

Title: **4907 UTILITY**
Author: John R. Carter, Sr.
        Tektronix, Inc.
        Santa Clara, CA
Memory Requirement: 8K
Peripherals: 4907 File Manager
Statements: 922
Files: 14 Program
      40 Data

UTILITY is a tutorial package of routines that offers the new user of a 4907 the ability to learn the machine by example; it teaches the new user how to access the 4907, from the Keyboard or by program control in BASIC.

Not all commands are used in this package as there are some whose inherent simplicity can neither be further simplified nor exemplified.

UTILITY details the more difficult commands to remember and use.

Each of the commands used offers two options: 1) how to input the command on the keyboard and 2) how to use the command in a program. There is a HELP routine which reviews all commands in a brief form, gives more detail than the reference guide and less than the reference manual; it is a practical on-line combination of both. For those who cannot remember all the commands, there is a LIST routine.

The first thing a typical user might want to do is write data into a file and then read it back and later modify it. There are four routines which access any file, or create one, in ASCII or BINARY: 1) Sequential in ASCII; 2) Sequential Binary (will handle numeric and alphanumeric data); 3) Ran-

dom Access ASCII; and 4) Random Access Binary (will handle alphanumeric only).

Use the reference manual to supplement this guide and for details beyond the scope of this application.

Program 10

Title: **Mass Storage Management System**
Author: Captain S.K. Sanford
        Aberdeen Proving Ground, MD
Memory Requirement: 32K
Peripherals: 4924 Digital Cartridge Tape
             Drive
Statements: 680

Files: 1 Program
      Requires dedicated tape
      Requires Scratch Tape in 4924

Use this program to track the contents of your mass storage media, specifically cassettes, disks and reel tapes.

Reports may be generated interactively based on volume ID, media type, availability status, applications, or assigned user. The date of assignment and number of assignments is also recorded.

The program is tutorial.

Program 11

Title: **Disk-to-Tape Back/Restore Utilities**

Author: John H. Grant
Tektronix, Inc.
Seattle, WA

Memory Requirement: 32K

Peripherals: 4907 File Manager

Statements: 800

Files: 8 Program

These utilities allow a user of a 4050/4907 system to archive his disk files onto tape. Specific capability of the utilities include:
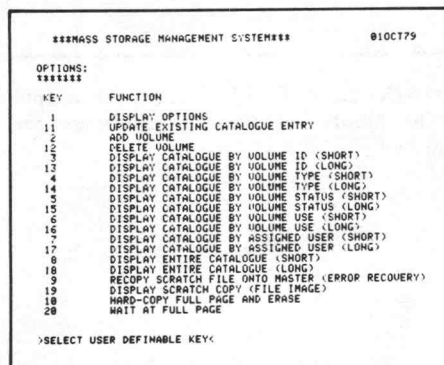
All file types supported by the 4907 File Manager may be archived and restored.

Multiple volume backups are supported, i.e., in the event that the information on the disk exceeds the capacity of a single tape, more than one tape will be used.

Directory editing for total backups is supported: files may be omitted from the backup process and file names which require passwords may (must) be modified to include the password.

Selective backups and restores are also supported.

Automatic hard copies of the archived and restored file names may be generated.

The disk-to-disk backup/recovery programs were designed specifically for owners of a single-drive 4907 who need to backup information from their disks.

However, it may also be used in multiple-drive configurations.

The disk-to-tape backup/restore utility contains a program to transfer the remaining programs onto disk.

```
        Enter the unit number of the disk drive -- 1

        Do you want to backup or restore a disk (B/R)? B

        Selective or total (S/T)? T

        Insert the disk you would like to backup in drive 1
          and press RETURN:

        Insert your disk backup tape (WARNING: any data on
          your tape will be destroyed).  When you are ready
          to continue, press RETURN:

        Do you need to edit the directory (Y/N)? Y

        The following functions are available:
                1    Directory listing
                2    Directory listing interrupt
                3    Delete directory item
                4    Modify directory item
                5    Edit complete
        Please make your selection via the user definable keys.
        #DIRECTORY

                     LIB1/PROG2
                     LIB1/LIB2/PROG3
                     LIB1/LIB2/LIB3/PROG4
                     LIB1/LIB2/LIB3/LIB4/PROG5
                     SYSLIB/BACKUP
                     SYSLIB/BACKUP.B01
                     SYSLIB/BACKUP.B02
                     SYSLIB/BACKUP.B03
                     SYSLIB/BACKUP.R01
                     SYSLIB/BACKUP.R02
                     SYSLIB/BACKUP.R03
                     SCRATCHLIB/ASCRAN
                     SCRATCHLIB/PROG1
                     SCRATCHLIB/RESTRICTED
                     SCRATCHLIB/PROG.TEST
                     SCRATCHLIB/BINSEQ1
                     SCRATCHLIB/BINSEQ
                     SCRATCHLIB/BINRAN1
                     SCRATCHLIB/BINRAN
                     SCRATCHLIB/ASCSEQ1
                     SCRATCHLIB/ASCSEQ
                     SCRATCHLIB/ASCRAN1

        Please make your selection via the user definable keys.
        #DELETE

          (To terminate DELETE mode, press RETURN when prompted for item.)

          Which item? PROG
          You want to delete LIB1/PROG2 (Y/N)? N
          You want to delete LIB1/LIB2/PROG3 (Y/N)? N
          You want to delete LIB1/LIB2/LIB3/PROG4 (Y/N)? N
          You want to delete LIB1/LIB2/LIB3/LIB4/PROG5 (Y/N)? N
          You want to delete SCRATCHLIB/PROG1 (Y/N)? N
          You want to delete SCRATCHLIB/PROG.TEST (Y/N)? N
            ###PROG not found###
          Which item? PROG1
          You want to delete SCRATCHLIB/PROG1 (Y/N)? Y
            ###DELETED###
          Which item?

        Please make your selection via the user definable keys.
        #MODIFY

          (To terminate MODIFY mode, press RETURN when prompted for item.)

          Which item? RESTRICTED
          You want to modify SCRATCHLIB/RESTRICTED (Y/N)? Y
            Enter the correct name: SCRATCHLIB/RESTRICTED:PASSWORD
            ###MODIFIED###
          Which item?

        Archived files --
                     @LIB1/PROG2
                     @LIB1/LIB2/PROG3
                     @LIB1/LIB2/LIB3/PROG4
                     @LIB1/LIB2/LIB3/LIB4/PROG5
                     @SYSLIB/BACKUP
                     @SYSLIB/BACKUP.B01
                     @SYSLIB/BACKUP.B02
                     @SYSLIB/BACKUP.B03
                     @SYSLIB/BACKUP.R01
                     @SYSLIB/BACKUP.R02
                     @SYSLIB/BACKUP.R03
                     @SCRATCHLIB/ASCRAN
                     @SCRATCHLIB/RESTRICTED:PASSWORD
                     @SCRATCHLIB/PROG.TEST
                     @SCRATCHLIB/BINSEQ1
        The end of the tape has been reached.  Please insert
          another tape and press RETURN to continue:
                     @SCRATCHLIB/BINSEQ
                     @SCRATCHLIB/BINRAN1

        The end of the tape has been reached.  Please insert
          another tape and press RETURN to continue:
                     @SCRATCHLIB/BINRAN
                     @SCRATCHLIB/ASCSEQ1
                     @SCRATCHLIB/ASCSEQ

        The end of the tape has been reached.  Please insert
          another tape and press RETURN to continue:
                     @SCRATCHLIB/ASCRAN1

        Disk backup completed.
```

Program 12

Title: **WANG 2200 to 4050 Conversion Guide**

Author: Nick Fkiaras
Tektronix, Inc.
Wilsonville, OR

Documentation Only

This instruction manual provides all the information required to convert WANG 2200 programs into 4050 compatible programs. The guide consists of five sections:

1. A hardware description that quickly familiarizes a WANG user with program entering and execution on the 4050.

2. A software section that describes: (a) the programming features unique to WANG, (b) all the language elements identical in name, function, and syntax on both machines, (c) all language elements in WANG that are different than 4050 BASIC in name, function or syntax. In this part the equivalent 4050 functions or a description of a routine to emulate WANG language elements given.

3. A description of how a user can transfer programs from a WANG 2200 to a 4050 via the data communications interfaces available on each machine.

4. Examples.

5. A brief description of how to approach this conversion problem.

This conversion guide is not to be interpreted to be authorization by Tektronix for any user to convert proprietary programs supplied by Wang.

Program 13

Title: **HP9830 to 4050 Conversion Guide**

Author: Nick Fkiaras
Tektronix, Inc.
Wilsonville, OR

Documentation Only

This instruction manual provides all the information required to convert HP9830 programs into 4050 compatible programs. The guide consists of seven sections.

1. A description of all the HP9830 systems covered by this guide.

2. The differences between the 9830 and a 4050 system in features related to entering and running a program.

3. A software section that describes: (a) the programming features unique to HP9830, (b) all the language elements identical in name, function and syntax on both machines, (c) all language elements in HP9830 that are different than 4050 BASIC in name, function or syntax. In this part the equivalent 4050 functions or a description of a routine to emulate HP9830 language elements given.

4. Examples.

5. A description of how a user can transfer programs from an HP9830 to a 4050 via the data communications interfaces available on each machine.

6. All the 4050 features that can be added to a HP9830 program to enhance it.

7. A brief outline of the steps to be taken when converting a program.

This conversion guide is not to be interpreted to be authorization by Tektronix for any user to convert proprietary programs supplied by Hewlett-Packard.

Program 14

Title: **CDOS 4907 Operating System**

Authors: Lynne Cueto
Tektronix, Inc.
Rockville, MD
Carl Dawson
Tektronix, Inc.
Orlando, FL

Revised by: Frits Handgraaf
Tektronix, Inc.
Amstelveen, The Netherlands

Memory Requirement: 16K
Peripherals: 4907 File Manager
Optional-4641 Printer

Statements: 1480
Files: 26 Program
28 Data

CDOS is an operating system for the 4050 and 4907 File manager. CDOS is a BASIC program which acts as an interface between the 4050 user and the 4907 File Manager. Support for a system log device to record transactions between the user and CDOS, and alternate console device for entering commands or displaying CDOS responses is also provided.

CDOS provides the following commands:

DISK	SYSTEM
COPY	BASIC
CREATE	CONSOLE
DIR	EDITOR
DISCTOTAPE	HELP
DUPLICATE	HELPLIST
FORMAT	LOG
KILL	PROFILE
LIBRARY	PURGE
MOUNT	RUN
RENAME	STATUS
TAPETODISC	STOP
UNIT	SYSTEM

```
DISCTOTAPE

Syntax-
   DISCTOTAPE filename,file-num,convert-to

Description-
   The DISCTOTAPE command is used to copy a disc file to the
   internal 4051 magnetic tape unit.

Operands-
   filename  - The file name on the disc which is to be
               copied to the tape unit.
   file-num  - The number of the file on the tape unit which is
               to receive the information. If the file does not
               exist, the user can specify either NEW or LAST.
               If NEW is specified, the tape is assumed to be
               a new tape and a file of the appropriate size
               is created as FILE 1. WARNING! This process will
               destroy any files on a tape that is not 'new'.
               If LAST is specified, a new file is created at
               the end of the tape.
   convert-to -This operand is used to indicate that the data
               in filename is to be converted to a different
               data type when put in the tape file. The options
               are ASCII, BINARY, or SAME. (If this operand is
               omitted, SAME is assumed.) WARNING! Caution should
               be used when converting data types between files.

Remarks-
   1. If the tape file exists, it will be checked to see if
      it is large enough to contain the information from
      filename. If it is large enough, it will be KILLed and
      then reused.
```

```
HELPLIST

Syntax-
   HELPLIST helpname

Description-
   The HELPLIST command is used to print the entire HELP listing
   out on a printer, or a selected HELP listing.

Operands-
   helpname - The name of the selected HELP listing from
              the Help Library. If omitted, all HELP listings
              are printed.

Remarks-
   1. The HELPLIST command will prompt the user for the device
      number to which the output is to be sent. (The screen
      is device number 32.)
   2. The HELPLIST command will prompt the user for a value
      which will indicate whether a Form Feed control character
      is to be used to force a new page (value = 0) or if blank
      lines should be generated to force a new page (value <0).
      A page is assumed to be 66 lines in length. A positive
      value (value > 1) will cause the specified number of
      blank lines to be generated between HELP listings instead
      of generating a new page each time.
```

```
TAPETODISC

Syntax-
   TAPETODISC file-num,filename,convert-to

Description-
   The TAPETODISC command is used to transfer a file from the
   internal 4051 tape unit to the disc.

Operands-
   file-num  - The file number on the tape to be copied to disc.
   filename  - The file name to be used on the disc. If the file
               name does not exist, it will be created provided
               sufficient space remains on the disc. If the file
               name currently exists, the user will be prompted
               to indicate whether the file can be destroyed and
               recreated with the appropriate attributes and
               file size.
   convert-to -This operand is used to indicate the data format
               of the information placed in filename. The options
               are ASCII, BINARY, or SAME. (If this operand is
               omitted, SAME is assumed.) Use extreme caution
               when attempting to change data types between
               files.

Remarks-
   1. If the tape file is a BINARY PROGRAM or SECRET file, the
      command CANCEL, since these types of files cannot be
      copied from tape to disc.
   2. After the file is copied, all unused space in the disc
      file is released.
```